

# ICSE 2025 EXAMINATION

## Sample Question Paper - 1

### Biology

**Time Allowed: 2 hours**

**Maximum Marks: 80**

**General Instructions:**

- Answers to this Paper must be written on the paper provided separately.
- You will not be allowed to write during first 15 minutes.
- This time is to be spent in reading the question paper.
- The time given at the head of this Paper is the time allowed for writing the answers.
- Section A is compulsory. Attempt any four questions from Section B.
- The intended marks for questions or parts of questions are given in brackets [ ].

#### Section A

1. **Question 1: Choose the correct answers to the questions from the given options. [15]**  
**(Do not copy the question, write the correct answers only.)**

- (i) In which condition of the day amongst the following the transpiration will be maximum? [1]
- |                    |                    |
|--------------------|--------------------|
| a) Humid and cool  | b) Humid and windy |
| c) Hot, dry, windy | d) Hot and humid   |
- (ii) A grown-up cell divides when the maximum size is attained and which disturb the \_\_\_\_\_. [1]
- |                             |                               |
|-----------------------------|-------------------------------|
| a) Chromosome-Hormone ratio | b) Chromosome-cytoplasm ratio |
| c) Enzyme-Hormone ratio     | d) Kern-plasma ratio          |
- (iii) From which of these, tears come? [1]
- |                     |                     |
|---------------------|---------------------|
| a) Eyeball          | b) Vitreous chamber |
| c) Lachrymal glands | d) Aqueous chamber  |
- (iv) Which one of the following is a greenhouse gas? [1]

a) Oxygen

b) Nitrogen

c) Methane

d) Sulphur dioxide

(v) While recording the pulse rate, where exactly does a doctor press on our wrist? [1]

a) Vein

b) Capillary

c) Artery

d) Nerve

(vi) **Assertion (A):** Ozone depletion can be reduced by limiting the use of air conditioners and refrigerators. [1]

**Reason (R):** Air conditioner and refrigerators release chlorofluorocarbons in the atmosphere that destroy ozone.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

(vii) Birth rate is the number of lives birth [1]

a) per 1000 people per decade

b) per 100 people per year

c) per 100 people per decade

d) per 1000 people per year

(viii) Ultrafiltrate generated by the glomerulus is having all the constituents of the blood plasma except [1]

a) RBC

b) All of these

c) protein

d) WBC

(ix) The first stable product formed during CO<sub>2</sub> fixation is [1]

a) oxygen

b) abscisic acid

c) glucose

d) Phosphoglyceric Acid (PGA)

(x) Which one of the following is the correct route during the transport of sperm in male (human)? [1]



- |  |  |
|--|--|
| a) Epididymis → Vas deferens → Urethra | b) Vas deferens → Epididymis → Urethra |
| c) Epididymis → Urethra → Vas deferens | d) Urethra → Epididymis → Vas deferens |

(xi) A chromosome when present in condensed form, consists of [1]

- |                   |                    |
|-------------------|--------------------|
| a) one chromatid  | b) four chromatids |
| c) two chromatids | d) five chromatids |

(xii) Cretinism and myxoedema are due to [1]

- |                                    |                                     |
|------------------------------------|-------------------------------------|
| a) Hyposecretion of thyroxine      | b) Hypersecretion of thyroxine      |
| c) Hyposecretion of growth hormone | d) Hypersecretion of growth hormone |

(xiii) The gradual continuous increase in average temperature of surface of the earth as a result of increase in concentration of CO<sub>2</sub> and CFCs is termed as [1]

- |                      |                      |
|----------------------|----------------------|
| a) greenhouse effect | b) ozone degradation |
| c) montreal protocol | d) global warming    |

(xiv) Given below are the adaptations found in leaves to favour the occurrence of photosynthesis process. Select a statement which is incorrect. [1]

- |                                 |  |
|---------------------------------|--|
| a) Large surface area of leaves | b) Presence of numerous stomata            |
| c) The thinness of leaves       | d) Increased chloroplasts on lower surface |

(xv) A mixed nerve [1]

- |   |   |
|---|---|
| a) has two or more roots from different parts of brain        | b) has a common root but branches into two nerves to different organs |
| c) carries sensations from two or more different sense organs | d) contains both sensory and motor fibres                             |

## 2. Question 2

[25]

(i) **Name the following:**

- i. The phenomenon by which living or dead plant cells absorb water by surface attraction. [1]
- ii. An apparatus that measures the rate of water uptake in a cut shoot due to transpiration. [1]
- iii. The loss of water from the injured parts of the plant. [1]
- iv. Hormones that regulate the secretion of other endocrine glands. [1]
- v. The gland that is also called hypophysis. [1]

(ii) **Arrange and rewrite the terms in each group in the correct order so as to be in a logical sequence beginning with the term that is underlined.**

- i. Given below is the set of five terms. Rewrite the terms in logical sequence as directed at the end of each statement. [1]  
Vagina, ovary, uterus, oviduct, cervix. (pathway of egg after ovulation)
- ii. Gyri and sulci are the folds of the cerebellum. [1]
- iii. Rewrite the completed explanation by inserting the key word in the space indicated by ^. [1]  
Osmosis is the movement of water molecule from its region of higher concentration to region of lower concentration through a ^ membrane.
- iv. Osmosis is active transport of molecules in cells. [1]
- v. Adenine : Thymine :: Cytosine : \_\_\_\_\_ [1]

(iii) **Fill in the blanks with suitable words:**

- i. Copy and complete the following by filling in the blanks 1 to 5 with appropriate words. [5]  
The human female gonads are ovaries. A maturing egg in the ovary is present in a sac of cells called (i)\_\_\_\_\_. As the egg grows larger, the follicle enlarges and gets filled with a fluid and is now called the (ii)\_\_\_\_\_ follicle. The process of releasing the egg from the ovary is called (iii)\_\_\_\_\_. The ovum is picked up by the oviduct funnel and fertilization

takes place in the (iv)\_\_\_\_\_. In about a week the blastocyst gets fixed in the endometrium of the uterus and this process is called (v)\_\_\_\_\_.

(iv) **Choose the odd one out from the following terms and name the category to which the others belong:**

- i. Urethra, uterus, urinary bladder, ureter. [1]
- ii. ACTH, TSH, ADH, FSH [1]
- iii. Addison's disease, Cushing's Syndrome, Acromegaly, Leukemia. [1]
- iv. Detergents, X-rays, Sewage, Oil spills [1]
- v. Syringes, Soiled dressings, Discarded needles, Household detergents: [1]

(v) **Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs.**

- i. Match the following columns. [5]

Column I	Column II
(a) Liver	(i) Knot-like tuft of blood capillaries in Bowman's capsule.
(b) Skin	(ii) Breakdown of proteins.
(c) Kidney	(iii) Sweat glands.
(d) Glomerulus	(iv) Bean-shaped excretory organ.

## Section B

**Attempt any 4 questions**

3. **Question 3** [10]

- (i) State Mendel's law of segregation. [1]
- (ii) Briefly explain the sex-linked inheritance. [2]
- (iii) Describe cell division. List various types of cell division. Also mention about the need of cell division? [2]
- (iv) List any three features of garden pea with their dominant and recessive traits. [2]

- (v) A certain species has three pairs of chromosomes- an acrocentric pair and two metacentric pairs. Draw a cell of this species as it would appear in metaphase of mitosis. [3]

4. **Question 4** [10]

- (i) What is the function of ear ossicles? [1]
- (ii) Given below are two structures, write their special functional activity. [2]
- i. Myelin sheath
  - ii. Relay neuron
- (iii) During a street fight between two individuals, mention the effects on the following organs by the autonomous nervous system, in the table given below (one has been done for you as an example). [2]

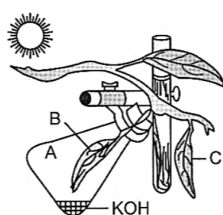
Organs	Sympathetic Nervous System	Parasympathetic Nervous System
Lungs	Dilates bronchi and bronchioles	Constricts bronchi and bronchioles
Pupil of the eye		
Salivary gland		

- (iv) Name the part of human brain which is concerned with the following [2]
- i. Seat of memory
  - ii. Coordinates muscular activity
- (v) Draw a well labelled diagram of a neuron and name the following parts: [3]
- i. Node of Ranvier
  - ii. Nissl's granules
  - iii. Cyton

5. **Question 5** [10]

- (i) State the main function of guard cells. [1]

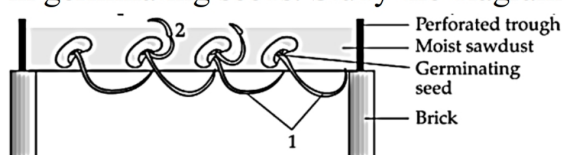
- (ii) What conditions enable RuBisCO to function as an oxygenase? Explain the ensuring process. [2]
- (iii) Plants have several pigments that can catch light energy. Two of these are chlorophyll-a and chlorophyll-b, which harness light of different wavelengths. What advantage does a plant obtain by having molecules that act at different wavelengths? [2]
- (iv) Explain briefly. [2]
- Respiration is said to be the reversal of photosynthesis.
  - Mention any two adaptations of plants for photosynthesis.
  - Name the place where dark reactions occur.
- (v) The figure given below represents an experiment to demonstrate a particular aspect of photosynthesis. The alphabet **B** represents a certain condition inside the flask. Observe the diagram and then answer the following questions. [3]



- What is the aim of the experiment?
- What happened to the leaf when tested with iodine?
- Which chemical can be used as an alternative of KOH?

## 6. Question 6 [10]

- (i) During which phase in cell cycle, proteins and RNA are synthesised for distribution to the daughter cells? [1]
- (ii) Differentiate between  $G_1$  and  $G_2$ -phase. [2]
- (iii) Given below is an experimental setup to demonstrate a particular tropic movement in germinating seeds. Study the diagram and answer the questions that follow: [3]



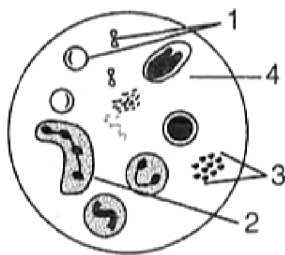
(i) Label the parts 1 and 2.



- a. Label the parts 1 and 2
- b. Name the tropic movement shown by part 1.
- c. What is thigmotropism? Give one example.

7. **Question 7** [10]

- (i) Who proposed the theory of **Natural Selection**? [1]
- (ii) Explain Darwin's concept of natural selection. [2]
- (iii) Describe Lamarck's theory of evolution. [2]
- (iv) Mention three main reasons for the sharp rise in human population in the world. [2]
- (v) Given below is a diagram of a human blood smear. Study the diagram and answer the questions that follow: [3]

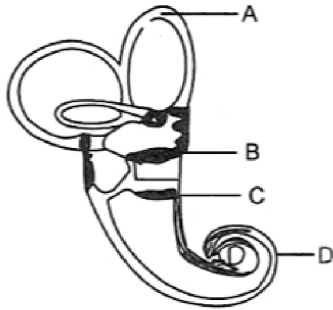


- a. Name the components numbered 1 to 4.
- b. Mention two structural differences between the parts 1 and 2.
- c. What is the average lifespan of the component numbered 1?

8. **Question 8** [10]

- (i) When separated by a semipermeable membrane, water enters the sugar solution. What would we call the sugar solution, osmotically active or inactive? Why? [1]
- (ii) From where to where do the following blood vessels carry blood? [2]
  - i. Hepatic vein
  - ii. Hepatic portal vein
- (iii) Answer the following. [2]
  - i. Name the greenhouse gases that cause global warming.
  - ii. Which of them caused ozone hole and how?

- (iv) The diagram given below represents the structure found in the inner ear. Study the same and then answer the questions that follows: [3]



- Name the part of the ear responsible for transmitting impulses to the brain.
- Name the audio receptor cells which pick up vibrations.
- Name the fluid present in the inner ear.

# Solution

## Section A

1. Question 1: Choose the correct answers to the questions from the given options. (Do not copy the question, write the correct answers only.)

(i) (c) Hot, dry, windy

**Explanation:** {

Hot, dry, windy

(ii) (d) Kern-plasma ratio

**Explanation:** {

A disturbance in the nucleoplasmic ratio will cause the cell to divide and attain stable ratio which is 1. If it is less or more than 1 the cell becomes unstable and divides again.

(iii) (c) Lachrymal glands

**Explanation:** {

Tears come from Lachrymal glands.

(iv) (c) Methane

**Explanation:** {

Methane

(v) (c) Artery

**Explanation:** {

Artery

(vi) (a) Both A and R are true and R is the correct explanation of A.

**Explanation:** {

Both A and R are true and R is the correct explanation of A.

(vii) (d) per 1000 people per year

**Explanation:** {

Birth rate is per 1000 people per year.

(viii) (a) RBC

**Explanation:** {

RBC

(ix) (d) Phosphoglyceric Acid (PGA)

**Explanation:** {

Phosphoglyceric Acid (PGA)

(x) **(a)** Epididymis → Vas deferens → Urethra

**Explanation:** {

Sperm is transported from Epididymis → Vas deferens → Urethra

(xi) **(c)** two chromatids

**Explanation:** {

two chromatids

(xii) **(a)** Hyposecretion of thyroxine

**Explanation:** {

Hyposecretion of thyroxine

(xiii) **(d)** global warming

**Explanation:** {

global warming

(xiv) **(d)** Increased chloroplasts on lower surface

**Explanation:** {

Increased chloroplasts on lower surface

(xv) **(d)** contains both sensory and motor fibres

**Explanation:** {

Mixed nerve contains both sensory and motor fibres.

## 2. Question 2

(i) Name the following:

i. 1. Imbibition

ii. 1. Potometer

iii. 1. Bleeding

iv. 1. Tropic hormones

v. 1. Pituitary gland

2. Pituitary

(ii) Arrange and rewrite the terms in each group in the correct order so as to be in a logical sequence beginning with the term that is underlined.

i. The logical sequence is ovary, oviduct, uterus, cervix and vagina.

ii. Gyri and sulci are the folds of cerebrum.

Cerebellum only contains gyri and not sulci.

iii. Osmosis is the movement of water molecule from its region of higher concentration to region of lower concentration through a semipermeable membrane.

iv. Osmosis is passive transport of molecules in cells.

v. Guanine

(iii) Fill in the blanks with suitable words:

i. (i) follicle, (ii) graafian, (iii) ovulation, (iv) fallopian tube/oviduct/uterine tube, (v) implantation

(iv) Choose the odd one out from the following terms and name the category to which the others belong:

i. **Odd term** - Uterus, a part of reproductive system.

**Category** - Organs of excretory system

ii. **Odd term** - ADH

**Category** - Hormones of anterior lobe of pituitary gland.

iii. **Odd term** - Leukemia

**Category** - Hormonal / Endocrinal disorders

iv. **Odd Term** : X-rays

**Category**: Water pollutants

v. **Odd term**: Household detergents

**Category**: Biomedical Wastes

(v) Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs.

i. (a) - (iii), (b) - (iv), (c) - (v), (d) - (ii)

## Section B

### 3. Question 3

(i) Law of segregation states that the two contrasting factors do not mix in the  $F_1$  hybrids but segregate or separate from each other at the time of gamete formation.

(ii) Sex-linked inheritance is the appearance of a trait which is due to the presence of an allele exclusively located on X-chromosome or Y-chromosome. This can be classified into two types X-linked inheritance and Y-linked inheritance.

(iii) Cell division, cell reproduction or cell multiplication is the process of formation of new daughter cells from the pre-existing cell or parent cell. It is of three types

i. Amitosis

ii. Mitosis

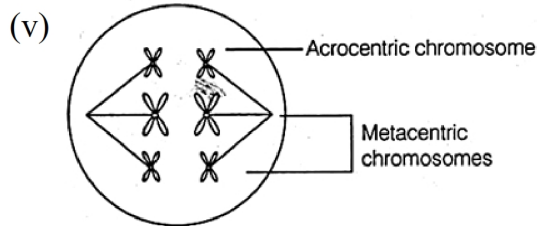
iii. Meiosis.

A cell divides when it attains the size and the nucleocytoplasmic ratio disturbs. The DNA duplication also causes a cell to divide.



(iv)

Character	Dominant	Recessive
Stem height	Tall	Short
Colour of seed	Yellow	Green
Shape of seed	Round	Wrinkled



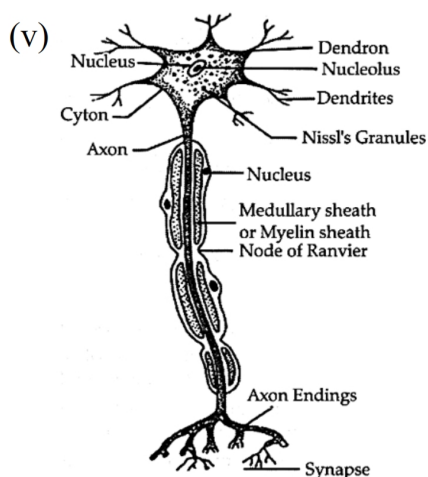
#### 4. Question 4

- (i) Amplifies sound vibration received by the tympanum and transmit it to inner ear/transfers sound vibrations from tympanum to cochlea.
- (ii) i. **Myelin sheath:** It provides an insulation around the axon for increasing the speed of impulses.
- ii. **Relay or connecting neuron:** It serves as a link between the sensory and motor neuron. These are mainly found in brain and spinal cord.

(iii)

Organs	Sympathetic Nervous System	Parasympathetic Nervous System
Lungs	Dilates bronchi and bronchioles	Constricts bronchi and bronchioles
Pupil of the eye	Dilates Pupil	Constricts Pupil
Salivary gland	Inhibits salivary glands and digestive glands	Stimulate salivary glands and digestive glands

- (iv) i. Part associated with seat of memory is cerebrum of the brain.
- ii. The part that coordinates muscular activity is cerebellum of the brain.



### 5. Question 5

- (i) Guard cells regulate  $\text{CO}_2$  influx from the atmosphere into the leaves for photosynthetic carbon fixation. Stomatal guard cells also regulate water loss of plants via transpiration to the atmosphere.
- (ii) Carboxylation is the most crucial step of the Calvin cycle, where  $\text{CO}_2$  is utilised for the carboxylation of RuBP. This reaction is catalysed by the enzyme RuBP carboxylase which results in the formation of 2 molecules of 3PGA. Since, this enzyme also has an oxygenation activity, it would be more correct to call it RuBP carboxylase-oxygenase or RubBisCO.
- (iii) Chlorophyll has various pigments like a and b. These pigments have a tendency to absorb different light or different wavelengths. Thus, this characteristic feature of various pigments of chlorophyll makes them most effective for photosynthesis.
- (iv)
  - i. Respiration is a catabolic process while photosynthesis is an anabolic process. During respiration,  $\text{O}_2$  is taken in and  $\text{CO}_2$  is given out while during photosynthesis,  $\text{CO}_2$  is taken in and  $\text{O}_2$  is given out.
  - ii. Two adaptations of plant for photosynthesis are:
    - a. Large surface area of the leaves.
    - b. Presence of chloroplasts.
  - iii. Dark reactions occur in the stroma of the chloroplast.
- (v)
  - a. The aim of the experiment is to show that  $\text{CO}_2$  is necessary for photosynthesis.
  - b. The leaf inside the flask does not give a blue-black colour when tested with iodine.
  - c. NaOH can be used as an alternative for KOH.

### 6. Question 6

(i) RNA and proteins are synthesised in both G<sub>1</sub>-phase and G<sub>2</sub>-phase.

(ii)	G <sub>1</sub> -phase	G <sub>2</sub> -phase
	It is called the first growth period.	It is a post-synthetic phase.
	Its duration is variable.	It lasts for 2-5 years.
	Cells grow in size.	Cell prepares to go into the mitotic phase.

(iii)a. Part 1 and 2 is as follows

1- Radicle

2- Plumule

b. The tropic movement is hydrotropism.

c. Movement of plant in response to touch stimulus.

**Example:** Pea, Vines, Cuscuta, Cucumber

## 7. Question 7

(i) Charles Darwin

(ii) According to Darwin's concept of natural selection, the organisms, which are provided with favourable variations would survive because they are fittest to face their surrounding, while the organisms, which are unfit for surrounding variations are destroyed.

(iii)**Lamarck's Theory:** It is known as theory of inheritance of acquired characters. According to this theory, organisms undergo certain changes to adapt themselves to the environment. These characters acquired by an organism during its lifetime, are passed on to the progeny, e.g. the long neck of giraffe was explained by Lamarck, as an outcome of these animals having to stretch their necks constantly to eat the leaves on the upper branches of the trees.

(iv) Three main reasons for sharp rise in human population in the world are:

i. Decreased death rate due to advanced medical facilities.

ii. Increase food availability due to advance agricultural technology.

iii. Fewer infants deaths.

(v) a. Name the components numbered '1' to '4' are as follows:

1. RBC

2. WBC

3. Platelets

4. Plasma

b. Structural differences between part 1 RBC and part 2 WBC are as follows:

RBC	WBC
-----	-----

Biconcave in shape	Amoeboid in shape
Nucleus absent	Nucleus present

c. The average lifespan of RBC is 120 days.

#### 8. Question 8

- (i) The sugar solution is osmotically active because it possesses lower water potential and can cause osmotic entry of water into it.
- (ii) i. Hepatic vein carries blood from liver to posterior vena cava.  
ii. Hepatic portal vein carries blood from intestine to liver.
- (iii) i. CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and CFCs.  
ii. CFCs cause ozone hole. These are used in refrigerators. They travel up to stratosphere. In the stratosphere, UV-rays act on them and a chlorine atom is released. These chlorine atoms act as catalyst and degrade ozone.
- (iv) a. The auditory nerve is the part of ear responsible for transmitting impulses to the brain.  
b. Organ of Corti is the audio receptor cells that pick up vibration.  
c. Endolymph is the fluid that is present in the inner ear.

# ICSE 2025 EXAMINATION

## Sample Question Paper - 2

### Biology

**Time Allowed: 2 hours**

**Maximum Marks: 80**

**General Instructions:**

- Answers to this Paper must be written on the paper provided separately.
- You will not be allowed to write during first 15 minutes.
- This time is to be spent in reading the question paper.
- The time given at the head of this Paper is the time allowed for writing the answers.
- Section A is compulsory. Attempt any four questions from Section B.
- The intended marks for questions or parts of questions are given in brackets [ ].

#### Section A

1. **Question 1: Choose the correct answers to the questions from the given options.** [15]

**(Do not copy the question, write the correct answers only.)**

- (i) The lower surface of leaf will have more number of stomata in a [1]
- |                      |  |
|----------------------|--|
| a) isobilateral leaf | b) isotopicbilateral leaf                  |
| c) dorsiventral leaf | d) both dorsiventral and isobilateral leaf |
- (ii) Lampbrush chromosome where two homologous chromosomes with several chiasmata with several loops in the chromatic region are found in \_\_\_\_\_. [1]
- |               |                       |
|---------------|-----------------------|
| a) Hair cells | b) Bean inflorescence |
| c) Egg yolks  | d) Skin cells         |
- (iii) Which of the following is true about neurilemma? [1]
- |   |  |
|---|--|
| a) A layer of fatty substance around axon | b) A layer of specialised neuroglia around myelin sheath of nerve fibres |
|---|--|



c) The cell membrane around the nerve cell

d) The connective tissue around a nerve tract

(iv) Which one of the following is non-biodegradable? [1]

a) Cardboard

b) Vegetable peel

c) Bark of trees

d) DDT

(v) The duration of a cardiac cycle is [1]

a) 0.9 second

b) 0.7 second

c) 0.8 second

d) 0.6 second

(vi) **Assertion (A):** Arctic's ozone depletion tends to be milder and short lived than the Antarctic's. [1]

**Reason (R):** CFCs, Frigid temperatures and sunlight are not present at the Arctic at the same time.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

(vii) Which method of contraception can provide protection against transmission of AIDS, syphilis and gonorrhoea? [1]

a) Female sterilisation (tying oviducts)

b) Condoms

c) Male sterilisation (cutting sperm ducts)

d) Oral contraceptive pills

(viii) Glomerular filtrate and blood plasma differ in the fact that [1]

a) plasma contains high level of chlorides

b) plasma contains proteins

- c) Both glomerular filtrate contains proteins and plasma contains high level of chlorides      d) glomerular filtrate contains proteins

(ix) The function of light energy used in photosynthesis is to [1]

- a) split  $\text{CO}_2$       b) reduce  $\text{CO}_2$   
c) Deactivate chlorophyll      d) activate chlorophyll

(x) Testes produce the hormone. [1]

- a) oxytocin      b) progesterone  
c) testosterone      d) oestrogen

(xi) Synthesis phase in the cell cycle is called so, because of the synthesis of more: [1]

- a) RNA      b) RNA and proteins  
c) Glucose      d) DNA

(xii) Which of the following glands is known as master gland? [1]

- a) Pituitary      b) Pancreas  
c) Kidneys      d) Adrenal glands

(xiii) Nuisance growth of aquatic plants and bloom-forming algae in natural water is generally due to high concentrations of [1]

- a) phosphorus      b) calcium  
c) carbon      d) sulphur

(xiv) The process of fixation of  $\text{CO}_2$  into a stable organic intermediate occurs by [1]

- a) carboxylation      b) isomerisation  
c) regeneration      d) reduction

(xv) Aqueous humour is present between the [1]

- a) Cornea and Lens      b) Lens and Retina

c) Iris and Lens

d) Cornea and Iris

2. **Question 2**

[25]

(i) **Name the following:**

- i. The outward movement of water molecules causes the cell to become flaccid. [1]
- ii. The permanently open structures seen on the bark of an old woody stem. [1]
- iii. The wax-like layer on the epidermis of leaves which reduces transpiration. [1]
- iv. The hormone that regulates the basal metabolic rate. [1]
- v. Group of hormones which influence other endocrine glands to produce hormones. [1]

(ii) **Arrange and rewrite the terms in each group in the correct order so as to be in a logical sequence beginning with the term that is underlined.**

- i. Given below is the set of five terms. Rewrite the terms in logical sequence as directed at the end of each statement. [1]  
Vagina, ovary, uterus, oviduct, cervix. (pathway of egg after ovulation)
- ii. Given below are sets of five terms each. Rewrite the terms in correct order in a logical sequence beginning with the first word that is underlined: [1]  
Conjunctiva, Yellow spot, Pupil, Vitreous Humour, Aqueous Humour.
- iii. The statement given below is incorrect. Rewrite the correct statement by changing the underlined words of the statement. [1]  
Free movement of solutes, in and out of the cell takes place across the cell membrane.
- iv. The first process by which water gets into the seed coat during germination is osmosis. [1]
- v. Adenine : Thymine :: Cytosine : \_\_\_\_\_ [1]

(iii) **Fill in the blanks with suitable words:**

- i. Copy and complete the following by filling in the blanks 1 to 5 with appropriate words. [5]

The human female gonads are ovaries. A maturing egg in the ovary is present in a sac of cells called (i)\_\_\_\_\_. As the egg grows larger, the follicle enlarges and gets filled with a fluid and is now called the (ii)\_\_\_\_\_ follicle. The process of releasing the egg from the ovary is called (iii)\_\_\_\_\_. The ovum is picked up by the oviduct funnel and fertilization takes place in the (iv)\_\_\_\_\_. In about a week the blastocyst gets fixed in the endometrium of the uterus and this process is called (v)\_\_\_\_\_.

- (iv) **Choose the odd one out from the following terms and name the category to which the others belong:**

- i. Urethra, uterus, urinary bladder, ureter. [1]  
ii. Cortisone, somatotropin, adrenocorticotrophic hormone, vasopressin [1]  
iii. Insulin, Adrenaline, Pepsin, Thyroxine. [1]  
iv. Sewage, Newspaper, Styrofoam, Hay [1]  
v. Formalin, Iodine, DDT, Lime [1]

- (v) **Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs.**

- i. Match the following columns. [5]

Column I	Column II
(a) Liver	(i) Knot-like tuft of blood capillaries in Bowman's capsule.
(b) Skin	(ii) Breakdown of proteins.
(c) Kidney	(iii) Sweat glands.
(d) Glomerulus	(iv) Bean-shaped excretory organ.

### Section B

**Attempt any 4 questions**

### 3. Question 3

[10]

- (i) Write the genotype of haemophilic son and carrier daughter. [1]
- (ii) Explain the following terms: [2]
  - i. Monohybrid cross
  - ii. Gene
  - iii. Phenotype
- (iii) Name a cell that is found arrested in diplotene stage for months and years. [2]  
Comment in 2-3 lines how it completes cell cycle?
- (iv) How many alleles of genes for X-linked traits are present in female and male individuals, respectively? [2]
- (v) Draw a well labelled diagram to show the metaphase stage of mitosis in an animal cell having four chromosomes. [3]

4. **Question 4** [10]

- (i) State the function of the suspensory ligament of the eye. [1]
- (ii) Write short notes on the following. [2]
  - i. Cochlea
  - ii. Organ of Corti
- (iii) Write the function of the following: [2]
  - i. Suspensory ligament
  - ii. Semicircular canals
- (iv) In what way sulci are different from gyri? [2]
- (v) Draw a well labelled diagram of a neuron showing the following parts: Dendrites, axon, node of Ranvier and myelin sheath. [3]

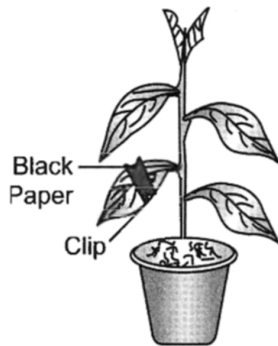
5. **Question 5** [10]

- (i) Does dark reaction occur in dark or light? Does it not require light? [1]
- (ii) Plants have several pigments that can catch light energy. Two of these are chlorophyll-a and chlorophyll-b, which harness light of different wavelengths. [2]



What advantage does a plant obtain by having molecules that act at different wavelengths?

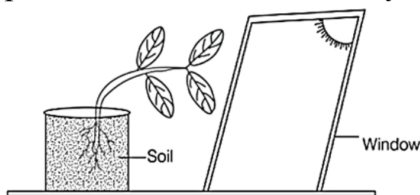
- (iii) What conditions enable RuBisCO to function as an oxygenase? Explain the ensuring process. [2]
- (iv) Explain the mechanism of opening and closing of stomata. [2]
- (v) The diagram given below represents an experiment conducted to prove the importance of a factor in photosynthesis. Study the same and then answer the questions that follow. [3]



- a. Name the factor being studied in this experiment.
- b. Name the solution used to test for the presence of starch in the leaf and put it.
- c. Give a balanced chemical equation to represent the process of photosynthesis.

**6. Question 6** [10]

- (i) Give example of nitrogen base in DNA. [1]
- (ii) Discuss with your teacher about [2]
- i. haploid insects and lower plants where cell division occurs.
- ii. some haploid cells in higher plants where cell division does not occur.
- (iii) The diagram given below represents a plant growing in a glass jar. The glass jar is placed near a window. Study the diagram and answer the questions that follows: [3]



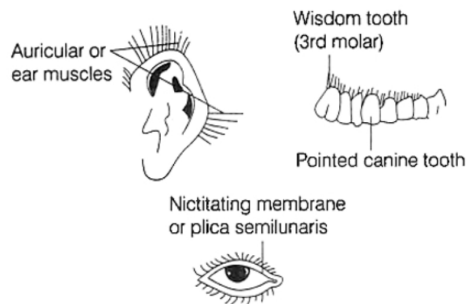
- a. Name the tropic movements shown by the shoot and roots.

- b. What is the stimulus that made the shoot bend towards the window?
- c. Which plant hormone caused the above effect?

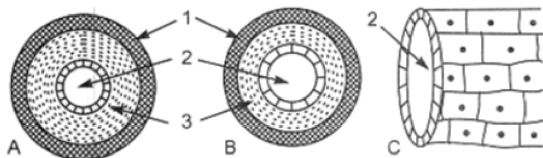
**7. Question 7**

[10]

- (i) Name the scientist who also came to similar conclusion as Darwin. Where did he work? [1]
- (ii) Given below are the few structures of human body. [2]



- i. What do these structures called?
- ii. Give any two characteristics of these structures.
- (iii) Explain how vestigial organs give an idea about evolution. [2]
- (iv) What are the age restrictions for marriage for boys and girls in India. [2]
- (v) The diagram given below are cross-section of blood vessels; [3]



- a. Identify the blood vessel A, B and C.
- b. Name the parts labelled 1 to 3.
- c. In which of the above vessels does the exchange of gases actually takes place.

**8. Question 8**

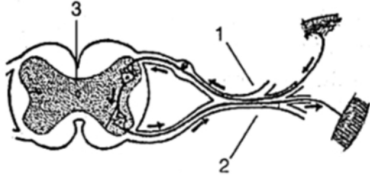
[10]

- (i) Briefly explain the term plasmolysis. [1]
- (ii) Mention the following. [2]
  - i. Average lifespan of RBCs.
  - ii. The two major categories of WBCs.

iii. Blood cells involved in leukaemia.

(iii) Is it possible that lake can achieve at that situation that it eventually dries up to form land? If yes, then how? Please explain. [2]

(iv) The diagram given below shows the internal structure of a spinal cord depicting a phenomenon. Study the diagram and answer the questions [3]



- Name the phenomenon that is depicted in the diagram. Define the phenomenon.
- Give the technical term for the points of contact between the two nerve cells.
- Name the parts numbered 1, 2, and 3.

# Solution

## Section A

1. Question 1: Choose the correct answers to the questions from the given options. (Do not copy the question, write the correct answers only.)

(i) **(c)** dorsiventral leaf

**Explanation:** {  
dorsiventral leaf

(ii) **(c)** Egg yolks

**Explanation:** {  
Egg yolk contains a lampbrush chromosome where two homologous chromosomes with several chiasmata with several loops in the chromatic region are found. They are also called giant chromosomes.

(iii) **(b)** A layer of specialised neuroglia around myelin sheath of nerve fibres

**Explanation:** {  
A layer of specialised neuroglia around the myelin sheath of nerve fibres is neurilemma.

(iv) **(d)** DDT

**Explanation:** {  
DDT

(v) **(c)** 0.8 second

**Explanation:** {  
0.8 second

(vi) **(a)** Both A and R are true and R is the correct explanation of A.

**Explanation:** {  
It is necessary to have all three at the same time for ozone layer to deplete. Thus both assertion and reason are true and reason is the correct explanation of the assertion.

(vii) **(b)** Condoms

**Explanation:** {  
Condoms provide a barrier while sexual intercourse.

(viii) **(b)** plasma contains proteins

**Explanation:** {  
plasma contains proteins

(ix)(d) activate chlorophyll

**Explanation:** {  
activate chlorophyll

(x) (c) testosteron

**Explanation:** {  
The testes synthesize: testosterone, needed for the development and maintenance of many physiological functions; and sperm, needed for male fertility.

(xi)(d) DNA

**Explanation:** {  
DNA

(xii)(a) Pituitary

**Explanation:** {  
Pituitary

(xii)(a) phosphorus

**Explanation:** {  
phosphorus

(xiv)(a) carboxylation

**Explanation:** {  
carboxylation

(xv)(a) Cornea and Lens

**Explanation:** {  
Aqueous humour is the liquid that is present between **eye lens and cornea**.

## 2. Question 2

(i) Name the following:

- i.
- ii. 1. Lenticel
- iii. 1. Cuticle
- iv. 1. Thyroxine
- v. 1. Tropic hormones  
2. Tropic

(ii) Arrange and rewrite the terms in each group in the correct order so as to be in a logical sequence beginning with the term that is underlined.

- i. The logical sequence is ovary, oviduct, uterus, cervix and vagina.
- ii. Conjunctiva, Pupil, Aqueous Humor, Vitreous Humor, Yellow Spot



- iii. Free movement of solutes, in and out of the cell takes place across the cell wall.
- iv. The first process by which water gets into the seed coat during germination is imbibition.
- v. Guanine

(iii) Fill in the blanks with suitable words:

- i. (i) follicle, (ii) graafian, (iii) ovulation, (iv) fallopian tube/oviduct/uterine tube, (v) implantation

(iv) Choose the odd one out from the following terms and name the category to which the others belong:

- i. **Odd term** - Uterus, a part of reproductive system.

**Category** - Organs of excretory system

- ii. **Odd term** - Cortisone

**Category** - Pituitary hormone.

- iii. **Odd term** - Pepsin

**Category** - Hormones

- iv. Odd term- Styrofoam is non-biodegradable, pollutant

**Category**- Biodegradable pollutants.

- v. **Odd term**: Iodine

**Category**: Disinfectants

(v) Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs.

- i. (a) - (iii), (b) - (iv), (c) - (v), (d) - (ii)

## Section B

### 3. Question 3

- (i)  $X^hY$ -Haemophilic son

$X^hX$ -Carrier daughter

- (ii) i. Monohybrid cross is the inheritance of one pair of contrasting characters.
- ii. Gene: Mendel presumed that a character is determined by a pair of factors present in each cell of an individual. These are known as genes in modern genetics.
- iii. Phenotype are the physical or observable characteristics of an organism which are genetically controlled.

(iii) In oocytes of some vertebrates, diplotene can last for months or years.

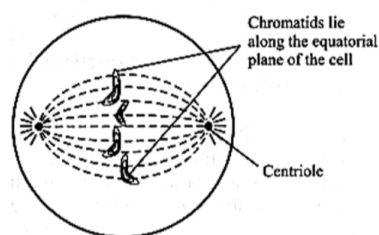
- i. Lampbrush chromosomes or diplotene chromosomes are found in the diplotene stage of most animal oocytes of frog or amphibians.

ii. Lampbrush chromosomes are observed in meiotic prophase. These chromosomes become normal after growth and thus completing the cell cycle.

(iv) For each gene corresponding to X-linked traits, females always have two alleles since they have two X-chromosomes.

Males only have one allele of genes related to X-linked traits, since they have only one X-chromosome.

(v) Metaphase stage of mitosis in animal cell is given below:



#### 4. Question 4

(i) Holding the eye (operative) lens in position.

(ii) i. The membranous labyrinth of inner ear is filled with a fluid called endolymph. The coiled portion of the labyrinth is called cochlea.

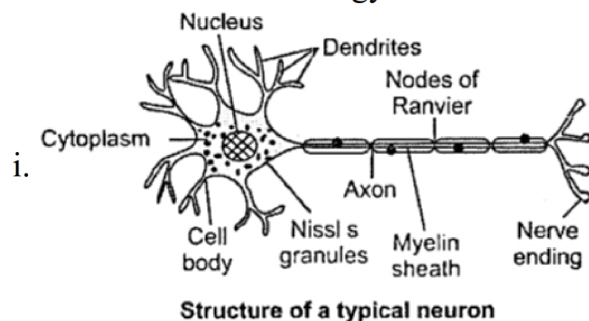
ii. Organ of Corti is a structure located on the basilar membrane of inner ear, which contains hair cells that act as auditory receptors.

(iii) i. Suspensory ligaments hold lens in position.

ii. Semicircular canals balance the body.

(iv) The cortex of the cerebrum is covered by a number of small, deep and shallow folds called sulci whereas, the convolutions of the brain, i.e. larger grooves (folds) that cover the cortex of the cerebrum are called gyri.

(v)



#### 5. Question 5

(i) Dark reaction occurs in day and night both. Its name dark reaction is given because it does not require light. Thus, it is also known as light-independent reaction.

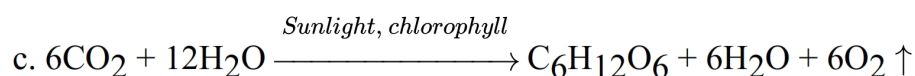
(ii) Chlorophyll has various pigments like a and b. These pigments have a tendency to absorb different light or different wavelengths. Thus, this characteristic feature of various pigments of chlorophyll makes them most effective for photosynthesis.

(iii) Carboxylation is the most crucial step of the Calvin cycle, where CO<sub>2</sub> is utilised for the carboxylation of RuBisCO. This reaction is catalysed by the enzyme RuBP carboxylase which results in the formation of 2 molecules of 3PGA. Since, this enzyme also has an oxygenation activity, it would be more correct to call it RuBP carboxylase-oxygenase or RubBisCO.

(iv) The opening and closing of stomata are controlled by turgor changes in the guard cells. The inner concave walls of the guard cells are thick than their outer walls. Due to the absorption of water, the guard cells become turgid. Their inner walls are pulled apart by their outer wall. The gap between the guard cells becomes wider. Thus, the stomata are open by guard cell. When guard cells are flaccid due to loss of water, the outer walls are not stretched, and their inner walls are not pulled apart decreasing the gap between the guard cells. Thus, the stomata close.

(v) a. Sunlight is the factor being studied in the experiment.

b. Iodine solution is used to test for the presence of starch in the leaf.



#### 6. Question 6

(i) Adenine is an example of nitrogen base found in DNA.

(ii) i. Male bees, wasps and ants are haploid organisms, because they are produced from unfertilized eggs.

ii. Synergids and antipodal cells in the ovule don't undergo cell division.

(iii) a. The tropic movements are phototropism by shoots and geotropism by roots.

b. Light is the stimulus that made the shoot bend towards the window.

c. Auxin causes the above effect.

#### 7. Question 7

(i) Alfred Wallace. He worked in Malay Archipelago.

(ii) i. These structures are called vestigial organs.

ii. These are present in reduced or rudimentary form in human body. They do not perform any function.



- (iii) Those organs, which no longer have a function in our body are known as vestigial organs. These organs have reduced structurally as well as functionally. It appears that these organs were once well-developed and functional in ancestors and later on due to their less use they become reduced, e.g. vermiform appendix in man is reduced and functionless while in herbivores vermiform appendix along with caecum is used for digestion of cellulose. It gives an idea that human had herbivorous food habit and cellulose containing materials were major part of their food.
- (iv) Age restriction for boys is 21 years and girls is 18 years in India.
- (v) a. The name of blood vessels labelled A, B and C are as follows:
- A - Artery
  - B - Vein
  - C - Capillary
- b. The parts labelled 1 to 3 are as follows:
- 1 - Connective tissue/ Tunica externa
  - 2 - Lumen
  - 3 - Muscular tissue/ Tunica Media
- c. In capillary exchange of gases take place.

#### 8. Question 8

- (i) Plasmolysis is the phenomena of contraction of cytoplasm from the cell wall.
- (ii) i. 120 days (approximately).  
ii. Granulocytes and agranulocytes.  
iii. WBCs.
- (iii) Yes, the natural ageing of lake occurs due to nutrient enrichment of its water. This phenomenon is known as eutrophication. The fertility of lake increases steadily and slowly due to nutrients. Thus, over the centuries, the organic debris of aquatic organisms piles up and makes lake shallower, marshy and eventually dry to form land.
- (iv) a. The given figure shows the phenomenon of reflex action. It is an involuntary or instantaneous reaction in response to a stimulus, e.g. coughing, blinking of eyes, sneezing, etc.
- b. The technical term for the points of contact between the two nerve cells is called synapse.
- c. Names of the parts numbered 1, 2 and 3 are:
- 1. Sensory neuron,
  - 2. Motor neuron
  - 3. Grey matter

# ICSE 2025 EXAMINATION

## Sample Question Paper - 3

### Biology

**Time Allowed: 2 hours**

**Maximum Marks: 80**

**General Instructions:**

- Answers to this Paper must be written on the paper provided separately.
- You will not be allowed to write during first 15 minutes.
- This time is to be spent in reading the question paper.
- The time given at the head of this Paper is the time allowed for writing the answers.
- Section A is compulsory. Attempt any four questions from Section B.
- The intended marks for questions or parts of questions are given in brackets [ ].

**Section A**

1. **Question 1: Choose the correct answers to the questions from the given options.** [15]

**(Do not copy the question, write the correct answers only.)**

(i) Which one of the following does not affect the rate of transpiration? [1]

a) Humidity

b) Wind

c) Light

d) Age of the plant

(ii) Cells which are not dividing are likely to be at: [1]

a) S phase

b) G<sub>1</sub>

c) G<sub>2</sub>

d) G<sub>0</sub>

(iii) A synapse is found between [1]

a) All of these

b) dendrite and axon terminal

c) dendrite and dendrite

d) axon terminal and axon terminal

(iv) Compressed Natural Gas (CNG) is [1]

a) butane

b) methane



c) propane

d) ethane

(v) A muscular wall is absent in:

[1]

a) Arteriole

### b) Capillary

c) Vein

d) Venule

(vi) **Assertion (A):** Ozone is very important layer of atmosphere.

[1]

**Reason (R):** Ozone protects the living organisms from harmful UV radiation of sun.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

(vii) Surgical method of sterilization in a woman involves cutting and tying of:

[1]

a) Oviduct

b) Uterus

c) Urethra

d) Ureter

(viii) The structural and functional unit of excretion in the human kidney is the:

[1]

a) Nephron

b) Ureter

c) Bowman's capsule

d) Renal pelvis

(ix) A destarched plant is one whose

[1]

a) Plant is free from starch.

b) Leaves are free from chlorophyll

c) Aerial parts are free from starch

d) leaves are free from starch

(x) Fertilisation is the process of fusion of male gamete and the female gamete to produce a/an:

[1]

a) embryo

b) infant

c) child

d) zygote

- (xi) DNA is made up of sugar, mainly [1]  
a) fructose b) hexose  
c) triose d) pentose
- (xii) Pancreas acts as [1]  
a) holocrine gland b) exocrine gland  
c) endocrine gland d) Both exocrine and endocrine gland
- (xiii) The prime source of chlorofluorocarbon is [1]  
a) Domestic sewage b) Industrial effluents  
c) Refrigeration equipments d) Vehicular emission
- (xiv) NADP is expanded as [1]  
a) Nicotinamide Adenine Dinucleolus Phosphate b) Nicotinamide Adenosine Dinucleolus Phosphate  
c) Nicotinamide Adenosine Dinucleoside Phosphate d) Nicotinamide Adenine Dinucleotide Phosphate
- (xv) Chemicals that are released at the synaptic junction are called [1]  
a) cerebrospinal fluid b) hormones  
c) neurotransmitters d) lymph

2. **Question 2** [25]

- (i) **Name the following:**
- i. A solution that causes water to move into the cell and swelling up. [1]
- ii. Loss of water as droplets through leaves of an intact plant is termed (bleeding, guttation, transpiration). [1]
- iii. The waxy layer on the epidermis of the leaf meant to reduce transpiration. [1]

iv. A condition that results in abnormally long bones, long lower jaw bone due to the hypersecretion of a pituitary hormone. [1]

v. Hormones that regulate the secretion of other endocrine glands. [1]

(ii) **Arrange and rewrite the terms in each group in the correct order so as to be in a logical sequence beginning with the term that is underlined.**

i. The statement given below is incorrect. Rewrite the correct statement by changing the underlined words of the statement. [1]

The Graafian follicle, after ovulation turns into a hormone producing tissue called corpus callosum.

ii. Given below are sets of five terms each. Rewrite the terms in correct order in a logical sequence beginning with the first word that is underlined: [1]

Conjunctiva, Yellow spot, Pupil, Vitreous Humour, Aqueous Humour.

iii. Osmosis is active transport of molecules in cells. [1]

iv. Soil water → root hair → cells of cortex → epidermis → xylem [1]

v. Adenine : Thymine :: Cytosine : \_\_\_\_\_ [1]

(iii) **Fill in the blanks with suitable words:**

i. Copy and complete the following by filling in the blanks 1 to 5 with appropriate words. [5]

The human female gonads are ovaries. A maturing egg in the ovary is present in a sac of cells called (i)\_\_\_\_\_. As the egg grows larger, the follicle enlarges and gets filled with a fluid and is now called the (ii)\_\_\_\_\_ follicle. The process of releasing the egg from the ovary is called (iii)\_\_\_\_\_. The ovum is picked up by the oviduct funnel and fertilization takes place in the (iv)\_\_\_\_\_. In about a week the blastocyst gets fixed in the endometrium of the uterus and this process is called (v)\_\_\_\_\_.

(iv) **Choose the odd one out from the following terms and name the category to which the others belong:**

i. Bile, Urea, Uric acid, Ammonia [1]

- ii. Vasopressin, growth hormone, TSH, ACTH, FSH. [1]
- iii. Cortisone, somatotropin, adrenocorticotrophic hormone, vasopressin [1]
- iv. Polythene bag, Crop residue, Animal waste, Decaying vegetable. [1]
- v. Detergents, X-rays, Sewage, Oil spills [1]

(v) **Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs.**

- i. Match the following columns. [5]

Column I	Column II
(a) Liver	(i) Knot-like tuft of blood capillaries in Bowman's capsule.
(b) Skin	(ii) Breakdown of proteins.
(c) Kidney	(iii) Sweat glands.
(d) Glomerulus	(iv) Bean-shaped excretory organ.

### Section B

**Attempt any 4 questions**

3. **Question 3** [10]

- (i) The sex of the child depends upon its father. Explain. [1]
- (ii) In a cross between a pure breed, red-eyed female fruitfly and a white-eyed male, what percentage of the male offsprings will have white eyes? (White eyes are X-linked, recessive). [2]
- (iii) Mention the differences between mitosis and meiosis with reference to [2]
  - i. Number of daughter cells formed at the end of cell division.
  - ii. The number of chromosome received
- (iv) Explain briefly: [2]
  - i. Mutation
  - ii. Homologous chromosomes
  - iii. Alleles

- (v) Draw a well labelled diagram to show the anaphase stage of mitosis in an animal cell having four chromosomes. [3]

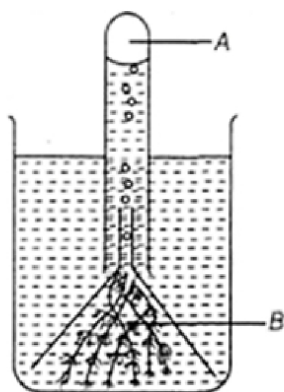
**4. Question 4 [10]**

- (i) Explain how the human eye adapts itself to bright light and dim light. [1]
- (ii) Explain, what does nervous system consist of? [2]
- (iii) Explain the mechanism of focusing the image of a distant object in our eye when we raise our head after reading a book. [2]
- (iv) Compare the Central Neural System (CNS) and Peripheral Neural System (PNS). [2]
- (v) Draw a well labelled diagram of a neuron showing the following parts: Dendrites, axon, node of Ranvier and myelin sheath. [3]

**5. Question 5 [10]**

- (i) Give one example of the following: [1]  
An aquatic plant used in the lab to demonstrate oxygen liberation during photosynthesis.
- (ii) Plants have several pigments that can catch light energy. Two of these are chlorophyll-a and chlorophyll-b, which harness light of different wavelengths. What advantage does a plant obtain by having molecules that act at different wavelengths? [2]
- (iii) What conditions enable RuBisCO to function as an oxygenase? Explain the ensuring process. [2]
- (iv) Draw a simple labelled diagram of a stomatal apparatus as seen in surface view. [2]
- (v) The following diagram demonstrates a physiological process taking place in green plants. The whole set-up was placed in bright sunlight for several hours. [3]





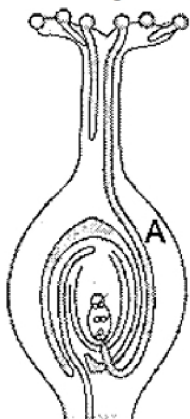
Study the diagram and answer the questions that follows:

- What aspect of the physiological process is being examined?
- Label the parts A and B in the diagram.
- Write a well-balanced chemical equation for the physiological process explained in (b) above.

**6. Question 6**

[10]

- Write the number of chromosomes present in a nerve cell of a human being. [1]
- What happens when a normal cell turns into a malignant cell? [2]
- The diagram given below represents a plant movement. [3]



- Explain the tropic movement mentioned in (a).
- Name the tropic movement shown in the diagram.
- Label the part marked A.

**7. Question 7**

[10]

- Given below are two stages in the evolution of man. Study them and answer the questions that follow: [1]

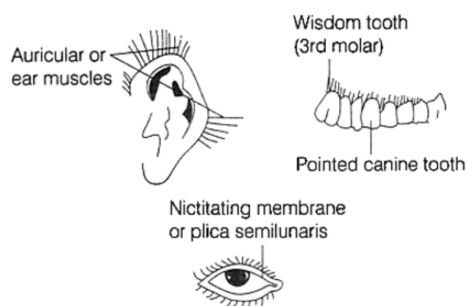


Identify Australopithecus and Neanderthal man from the above pictures.

(ii) Name the ancestors of man based on the features given below [2]

- i. Human-like meat eater with 900 cc brain, lived in Java.
- ii. More human with brain size 1400 cc, lived in Central Asia, used hides and buried their dead.
- iii. Human-like, vegetarian, with brain capacity between 650 cc and 800 cc.

(iii) Given below are the few structures of human body. [2]

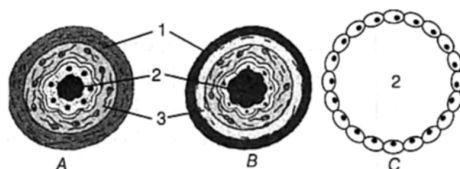


- i. What do these structures called?
- ii. Give any two characteristics of these structures.

(iv) List the effects of following on human population of an area [2]

- i. Immigration
- ii. Emmigration

(v) The diagrams given below are cross-sections of blood vessels [3]



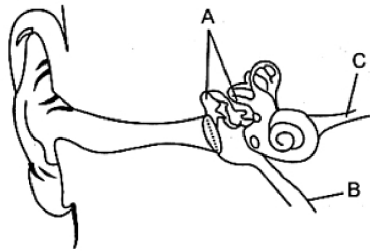
- a. Identify the blood vessels A, B and C.
- b. Name the parts labelled 1 to 3.

c. Mention one structural difference between A and B.

8. **Question 8**

[10]

- (i) How does most of the water move within the root? [1]
- (ii) What is the significance of time gap in the passage of impulse from sino-atrial node to the ventricle? [2]
- (iii) A village is located near a bank of river. There an industrial setup started in village near river. After the industrial setup, the health of people becomes low. Why? Please explain. [2]
- (iv) Given below is the diagram of the human ear. Study the same and answer the questions that follow: [3]



- a. Name the part labelled **B** and state its function.
- b. Name the part labelled **C** and state its function.
- c. Give the function of ear wax.

# Solution

## Section A

1. Question 1: Choose the correct answers to the questions from the given options. (Do not copy the question, write the correct answers only.)

(i) **(d)** Age of the plant

**Explanation:** {

Age of the plant

(ii) **(d)**  $G_0$

**Explanation:** {

$G_0$  phase or quiescent stage. It occurs due to the non-availability of nitrogen and energy-rich compounds.

(iii) **(b)** dendrite and axon terminal

**Explanation:** {

Synapse, also called neuronal junction, is the site of transmission of electric nerve impulses from between the dendrite and axon terminal.

(iv) **(b)** methane

**Explanation:** {

methane

(v) **(b)** Capillary

**Explanation:** {

Capillary

(vi) **(a)** Both A and R are true and R is the correct explanation of A.

**Explanation:** {

Both A and R are true and R is the correct explanation of A.

(vii) **(a)** Oviduct

**Explanation:** {

The surgical procedure is tubal ligation, in which the oviduct (fallopian tube) is cut or sealed.

(viii) **(a)** Nephron

**Explanation:** {

Nephron

(ix)(d) leaves are free from starch

**Explanation:** {

leaves are free from starch

(x) (d) zygote

**Explanation:** {

zygote form by fusion of male and female gamete.

(xi)(d) pentose

**Explanation:** {

pentose

(xii)(d) Both exocrine and endocrine gland

**Explanation:** {

Both exocrine and endocrine gland

(xiii)(c) Refrigeration equipments

**Explanation:** {

Refrigeration equipments

(xiv)(d) Nicotinamide Adenine Dinucleotide Phosphate

**Explanation:** {

Nicotinamide Adenine Dinucleotide Phosphate

(xv)(c) neurotransmitters

**Explanation:** {

Chemicals that are released at the synaptic junction are called **neurotransmitters**. A synapse is a junction present between two neurons.

## 2. Question 2

(i) Name the following:

i. 1. Hypotonic

ii. 1. Guttation

iii. 1. Cuticle

iv.

v. 1. Tropic hormones

(ii) Arrange and rewrite the terms in each group in the correct order so as to be in a logical sequence beginning with the term that is underlined.

i. The Graafian follicle, after ovulation turns into a hormone producing tissue called Corpus luteum.

ii. Conjunctiva, Pupil, Aqueous Humor, Vitreous Humor, Yellow Spot



iii. Osmosis is passive transport of molecules in cells.

iv. **Incorrect term:** Epidermis

**Correct term:** Endodermis

v. Guanine

(iii) Fill in the blanks with suitable words:

i. (i) follicle, (ii) graafian, (iii) ovulation, (iv) fallopian tube/oviduct/uterine tube, (v) implantation

(iv) Choose the odd one out from the following terms and name the category to which the others belong:

i. **Odd term:** Bile

**Category:** Nitrogenous wastes/Excretory substances

ii. **Odd one:** Vasopressin (Secreted by posterior pituitary).

**Category:** All other hormones are secreted by anterior lobe of pituitary gland.

iii. **Odd term** - Cortisone

**Category** - Pituitary hormone.

iv. Odd term - Polythene bag

Category - Biodegradable wastes

v. Odd Term : X-rays

Category: Water pollutants

(v) Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs.

i. (a) - (iii), (b) - (iv), (c) - (v), (d) - (ii)

## Section B

### 3. Question 3

(i) Sex chromosomes of female are homozygous (XX) while in male it is heterozygous (XY). If a sperm bearing X-chromosome fertilizes with the ovum, XX zygote formed is a female child. If a sperm bearing Y-chromosome fertilizes with the ovum, XY zygote formed is a male child. So the sex of a child depends upon its father.

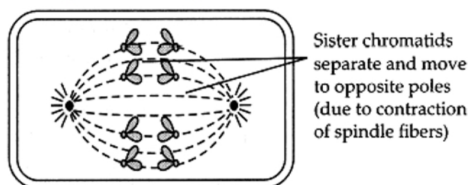
(ii) 0%. All the males and females will be red-eyed. Pure breed female (XX) is homozygous for normal X-chromosome. White-eyed male ( $X^oY$ ) is hemizygous for X-chromosome with a white eye mutation.

		Sperm	
		X <sup>o</sup>	Y
Egg	X	XX <sup>o</sup>	XY
	X	XX <sup>o</sup>	XY

Both male and female offsprings will inherit a normal X-chromosome from the female.

(iii) i.	Mitosis	Meiosis
	Two daughter cells are produced at the end of cell division	Four daughter cells are produced at the end of cell division.
ii.	Mitosis	Meiosis
	Daughter cells receive full set of chromosomes, i.e. diploid (2n) number of chromosomes.	Daughter cells receive only half the number of chromosomes, i.e. haploid (n) number of chromosomes.

- (iv) i. Mutation is a rare, random, discontinuous inheritable change in the genetic material of an organism.
- ii. A pair of chromosomes of the same size and shape bearing corresponding genes governing the same set of traits.
- iii. Alleles or allelomorphs are various forms of gene or mendelian factor which occurs on the same locus on homologous chromosomes and control the same character. They control different expressions or traits of the same character (e.g., tallness and dwarfness in Pea).
- (v) Anaphase stage of mitosis in animal cell is given below:



#### 4. Question 4

- (i) **Bright light:** Pupils constrict, Rhodopsin is bleached.  
**Dim light:** Pupils dilate, Rhodopsin is regenerated.
- (ii) The nervous system consists of
- Central Nervous System (CNS):** It comprises brain and spinal cord.
  - Peripheral Nervous System (PNS):** It comprises cranial and spinal nerves.

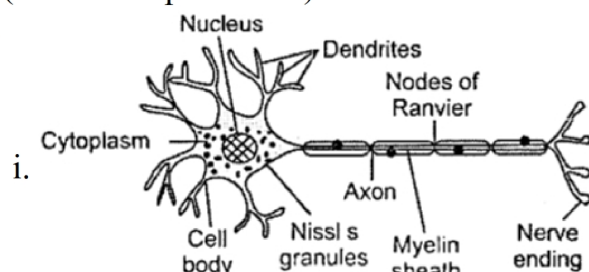
iii. **Autonomic Nervous System (ANS):** It comprises parasympathetic and sympathetic nerves.

(iii) While reading a book (near by vision), the lens of our eye is more convex or rounded but when we focus our eye on a distant object, the ciliary muscles are relaxed.

The lens becomes concave or flattened. This accommodation power of eye enables us to have a clear vision of objects at varying distances.

(iv) The CNS includes the brain and the spinal cord and is the site of information processing and control. The PNS comprises of all the nerves of the body associated with the CNS (brain and spinal cord).

(v)



Structure of a typical neuron

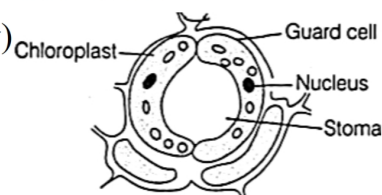
## 5. Question 5

(i) Hydrilla.

(ii) Chlorophyll has various pigments like a and b. These pigments have a tendency to absorb different light or different wavelengths. Thus, this characteristic feature of various pigments of chlorophyll makes them most effective for photosynthesis.

(iii) Carboxylation is the most crucial step of the Calvin cycle, where CO<sub>2</sub> is utilised for the carboxylation of RuBisCO. This reaction is catalysed by the enzyme RuBP carboxylase which results in the formation of 2 molecules of 3PGA. Since, this enzyme also has an oxygenation activity, it would be more correct to call it RuBP carboxylase-oxygenase or RubBisCO.

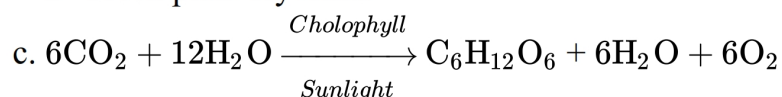
(iv)



(v) a. Release of O<sub>2</sub> in photosynthesis is being examined in the experiment.

b. A-Oxygen in a test tube.

B-Green plant Hydrilla.



6. Question 6

- (i) All the cells of the body except gamete cells contain 46 (23 pairs) of chromosome. The nerve cell of human beings are somatic cells and hence contain 46 chromosome.
- (ii) Cells usually stop dividing after certain number of divisions. In malignant or cancerous cells this automatic stoppage of cell division does not work. As a result malignant cells keep on dividing endlessly causing tumour or the cancerous growth.
- (iii) a. The tropic movement mention in (a) is Chemotropism.
  - b. The growth or movement of a plant or part of plant in response to a chemical stimulus is called chemotropism.
  - c. The part marked A is Pollen tube.

7. Question 7

- (i) a. Australopithecus
  - b. Neanderthal man
- (ii) i. Homo erectus
  - ii. Neanderthal man
  - iii. Homo habilis
- (iii) i. These structure are called vestigial organs.
  - ii. These are present in reduced or ruminant form in human body. They do not perform any function.
- (iv) i. Immigration is the permanent movement of people from outside to an area thus, it increases the population.
  - ii. Emmigration involves permanent movement of people from one area to another. It has negative (decreasing) impact on population.
- (v) a. The blood vessel A, B and C are
  - A - Artery
  - B - Vein
  - C - Capillary
- b. 1 - Tunica adventitia
  - 2- Lumen
  - 3 - Tunica media
- c. The structural difference between A and B is

A (Artery)	B (Vein)
------------	----------



They have narrow lumen and valves are absent.	They have widen lumen and valves are present.
---	---

#### 8. Question 8

- (i) By transpiration pull, cohesion and adhesion property of water molecules.
- (ii) The time gap in the passage of impulse from sino-atrial node to the ventricles allows ventricles to relax. Fall in the ventricular pressure, results in the closing of semilunar valves which prevents the backflow of blood into the ventricles.
- (iii) Industrial setup near bank of river disposes its wastes. These wastes are accumulated in aquatic animals which are later eaten up by humans. Thus, the health of such humans becomes degraded and they may suffer from severe nervous system problems.
- (iv) a. Part 'B' is called a eustachian tube which acts as a ventilator to equalize the pressure of air on both sides of the tympanic membrane that forms the outer boundary of the middle ear.
  - b. Part 'C' is the auditory nerve (vestibular and cochlear nerve) which carries hearing impulses to the brain.
  - c. Ear wax helps to lubricate the tympanum for proper functioning.



# ICSE 2025 EXAMINATION

## Sample Question Paper - 15

### BIOLOGY

Time: 2 hrs.

Total Marks: 80

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#### General Instructions:

1. Answers to this paper must be written on the paper provided separately.
  2. You will be not allowed to write during first 15 minutes.
  3. This time is to be spent in reading the question paper.
  4. The time given at the head of this paper is the time allowed for writing the answers.
- 

**Section A** is compulsory. Attempt any **four questions** from **Section B**.  
The intended marks for questions or parts of questions are given in brackets [ ]

---

#### SECTION A

*(Attempt all questions from this Section.)*

#### Question 1

Choose the correct answers to the questions from the given options.

(Do not copy the question, write the correct answer only.)

[15]

- (i) **Assertion (A):** Centrosome is the point of attachment of two chromatids of a chromosome.

**Reason (R):** Centrosome initiates and regulates the process of cell division as it helps in the formation of spindle fibres.

1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

- (ii) Pulse wave is mainly caused by the

1. Systole of the left atrium
2. Systole of the right atrium
3. Systole of the left ventricle
4. Systole of the right ventricle

- (iii) Mrs. Sharma is suffering from gout. Which of the following constituents is likely to be found in greater concentration in her blood?

1. Urea
2. Glucose
3. Uric acid
4. Bile pigments

(iv) A gland which secretes both, a hormone and an enzyme is the

1. Pituitary
2. Pancreas
3. Thyroid
4. Adrenal

(v) The ventral root ganglion of the spinal cord contains axons of the

1. Motor neuron
2. Sensory neuron
3. Relay neuron
4. Association neuron

(vi) **Assertion (A):** Amniotic fluid fills the space between the amnion and the embryo.

**Reason (R):** The fluid maintains an even pressure all around the embryo.

1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

(vii) Mrs. Khan and her husband decided to plan their pregnancy. Which of the following methods of contraception should be used if they want to prevent the release of the egg from the ovary?

1. Condoms
2. Diaphragms
3. Contraceptive pills
4. Spermicidals

(viii) **Assertion (A):** Ethylene is the only hormone which is a gas at ordinary temperature.

**Reason (R):** It helps in the ripening of fruits and is produced in the roots.

1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

(ix) Raj inserted a hairpin into his right ear to remove ear wax. He felt a sudden sharp pain with loss of hearing. This was due to the rupture of

1. Eardrum
2. Vestibule
3. Cornea
4. Pinna



(x) A pressure developed in a solution when it is separated from pure water by a semipermeable membrane is called

1. Root pressure
2. Transpiration pull
3. Osmotic pressure
4. Hydrostatic pressure

(xi) F.W. Went coined a term which means to grow. This term is

1. Auxin
2. Regenerate
3. Apical dominance
4. Cytokinin

(xii) **Assertion (A):** Photosynthesis occurs in all parts of a green plant.

**Reason (R):** Chlorophyll is the green pigment which traps solar energy during daytime.

1. Both A and R are true
2. Both A and R are false
3. A is true and R is false
4. A is false and R is true

(xiii) Given below are a few adaptations in plants to reduce the rate of transpiration.

- I. Sunken stomata covered with hairs
- II. Narrow leaves
- III. Leaves modified into spines
- IV. Leaves covered with a thick cuticle

Which of the above adaptations are found in *Nerium* to reduce water loss?

1. I and II
2. II and III
3. III and IV
4. I and IV

(xiv) Industrial melanism was highlighted by

1. Polar bear
2. Butterfly
3. Peppered moth
4. Bear

- (xv) If a round, green seeded plant (RRyy) is crossed with a wrinkled, yellow seeded plant (rrYY), the seeds produced in F<sub>1</sub> generation are:
1. Round and green
  2. Round and yellow
  3. Wrinkled and green
  4. Wrinkled and yellow

## Question 2

**(i) Name the following:**

**[5]**

- (a) An accessory gland in human males whose secretion activates the human sperm.
- (b) The process by which water enters the root hair.
- (c) A chemical which caused Minamata disease in Japan.
- (d) An instrument used to find the rate of transpiration in plants.
- (e) A substance which is found in excess in the urine of a diabetic person.

**(ii) Given below is a set of terms arranged in a logical sequence, representing a process or a function. Of these, one term is incorrect. Identify the incorrect term and replace it with the correct term. One has been done for you as an example. [5]**

E.g., Pollen grain → Exine → Staminal tube → Male gametes → Micropyle

Incorrect term - Staminal tube, Correct term - Pollen tube

- (a) Seminiferous tubule → Sperm → Sperm duct → Accessory glands → Semen → Ureter.
- (b) Soil water → Root hair → Cells of cortex → Epidermis → Xylem.
- (c) Oxygen → Stoma → Respiratory cavity → Mesophyll cells → Oxidation of glucose → 2 ATP.
- (d) Pupil → Eye lens → Vitreous humour → Fovea → Auditory nerve.
- (e) Sensory nerve → Dorsal root ganglion → Sensory neuron → Motor neuron → Receptor.

**(iii) In the box given below is a list of biological terms that can be used to complete the statements that follow. Select the appropriate term from the box and re-write the completed statement. You can use a term only once: [5]**

Concave, Neuron, Seminiferous tubule, Epididymis, Animal waste, Gestation, Nerve, Ethyl alcohol, Nephron, Myopia, DDT, Pregnancy, Convex
--

- (a) The type of lens used to correct myopia is \_\_\_\_.
- (b) The basic unit of the nervous system is the \_\_\_\_.
- (c) Sperms are produced in the \_\_\_\_.
- (d) A non-degradable pollutant is \_\_\_\_.
- (e) The period of complete development of the foetus till birth is termed as \_\_\_\_.



**(iv) Write the chief functional activity of each of the following:** [5]

- (a) Bone marrow: \_\_\_\_\_.
- (b) Meninges: \_\_\_\_\_.
- (c) Thick cuticle: \_\_\_\_\_.
- (d) Cerebellum: \_\_\_\_\_.
- (e) Collecting duct: \_\_\_\_\_.

**(v) Match the terms in Column I with their explanations in Column II.** [5]

Column I	Column II
1. Testosterone	a) Help in balancing while the body is in motion
2. Renal artery	b) Corpus luteum
3. Semicircular canals	c) Leydig cells
4. Progesterone	d) Defective haemoglobin in RBCs
5. Sickle-cell anaemia	e) Contains more urea
	f) Help in balancing while the body is at rest
	g) Contains less urea



## SECTION B

*(Attempt any four questions from this section.)*

### Question 3

- (i) What is the role of the ciliary muscles? [1]
- (ii) Why does the blood in the arteries flow in spurts? [2]
- (iii) Draw a neat and labelled diagram of a chloroplast. [2]
- (iv) Mention two reasons for the rapid increase in the population of India. [2]
- (v) The figure shows a leaf after an experiment. [3]



- (a) What is the aim of the experiment?
- (b) What colour do parts A and B show after the experiment?
- (c) What will be the colour of part C?



#### Question 4

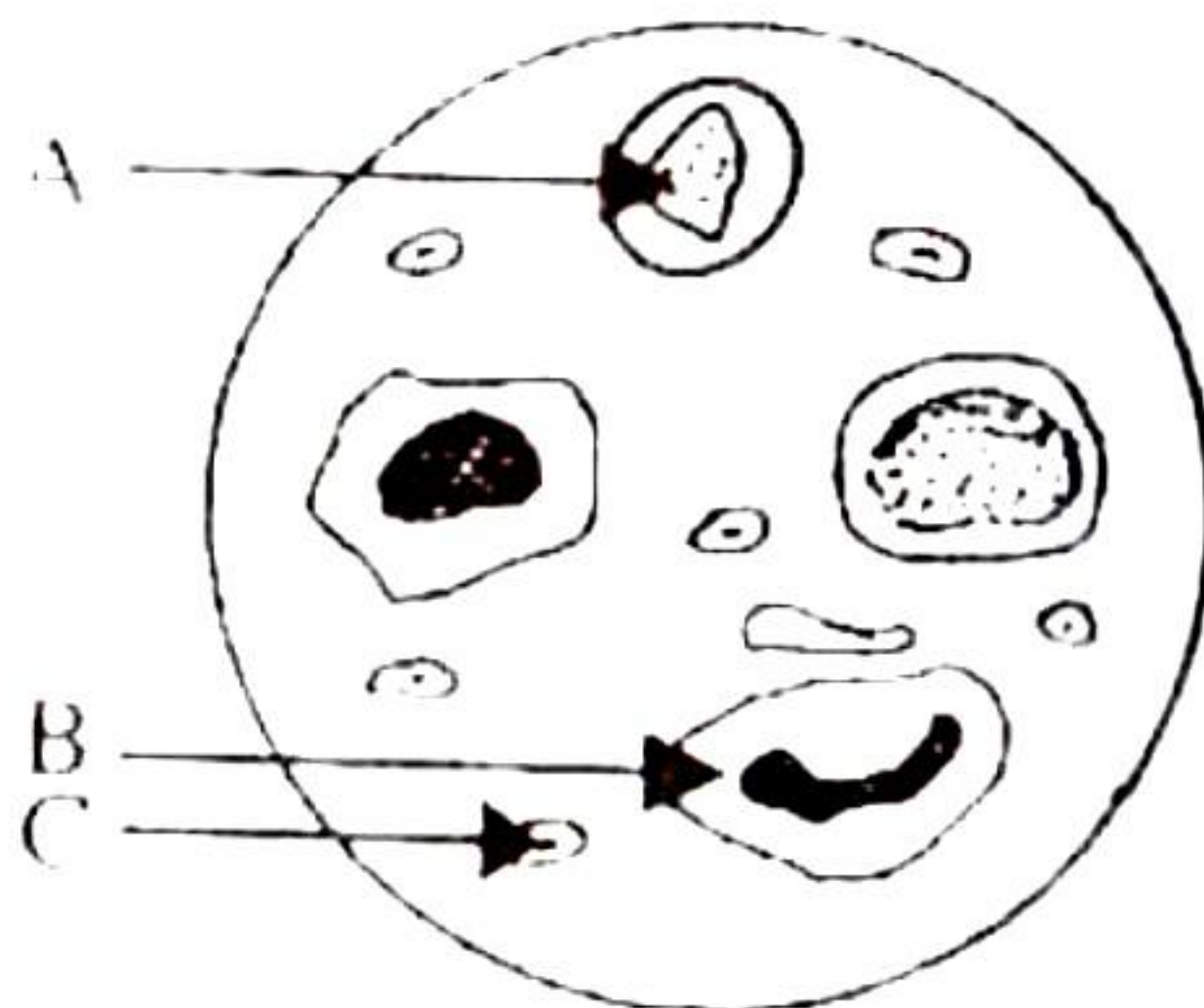
- (i) Define: Photophosphorylation. [1]
- (ii) Why is it harmful to use a sharp object to remove wax from our ears? [2]
- (iii) Draw a neat and labelled diagram of an open stomata. [2]
- (iv) Give reason: We urinate fewer times in summer than in winter and the urine passed is generally thicker. [2]
- (v) The figure shows an endocrine gland. [3]



- (a) Name the gland.
- (b) Label the parts 1 and 2.
- (c) Write the location of the gland.

#### Question 5

- (i) Name two surgical methods to control population in humans. [1]
- (ii) Give reason: Marine fish burst when placed under tap water. [2]
- (iii) What is dialysis? Under what conditions is it performed? [2]
- (iv) Explain with the help of a chart what will be the colour of a child's hair, if the father has a dominant gene for black hair and the mother has a recessive gene for brown hair? [2]
- (v) The diagram given below represents a blood smear. [3]

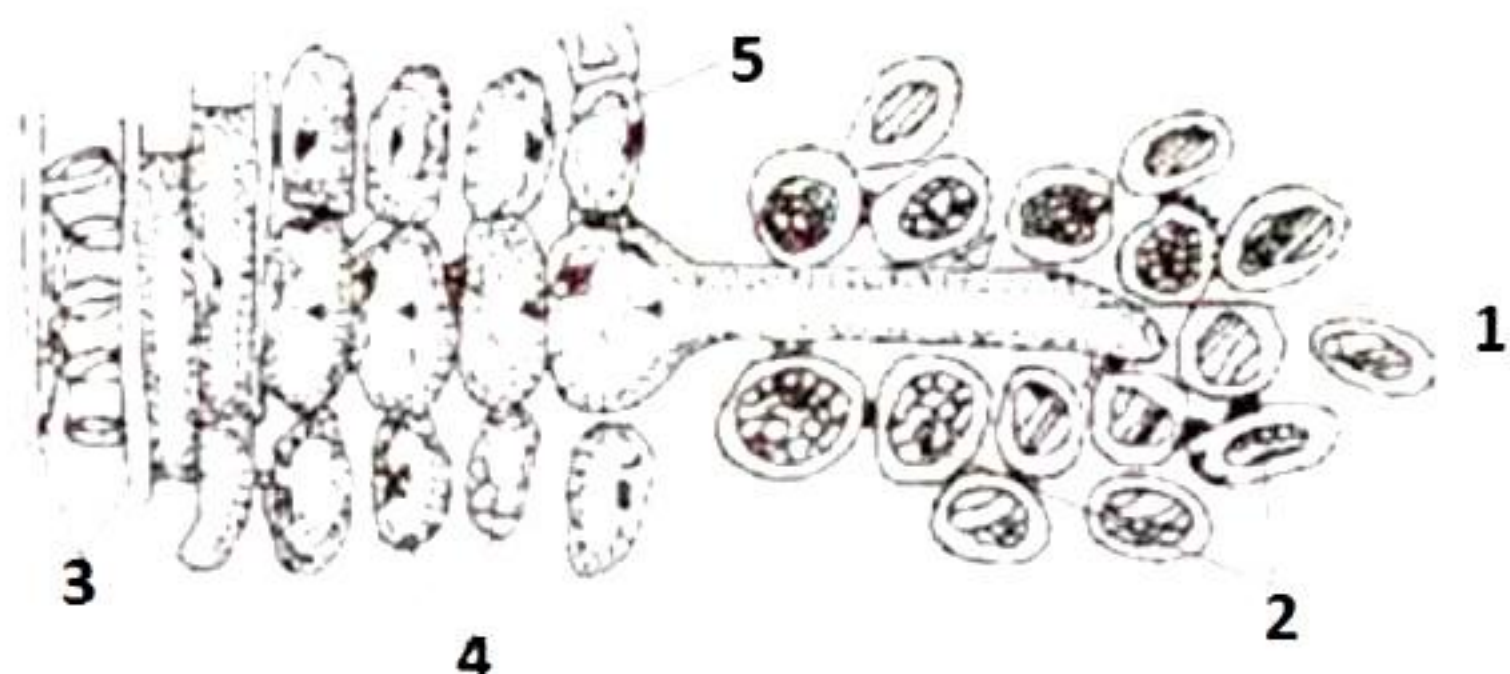


- (a) Identify A, B and C by giving their scientific names.
- (b) State one important function of each.
- (c) State two characteristics of B which enable it to carry out its function.



### Question 6

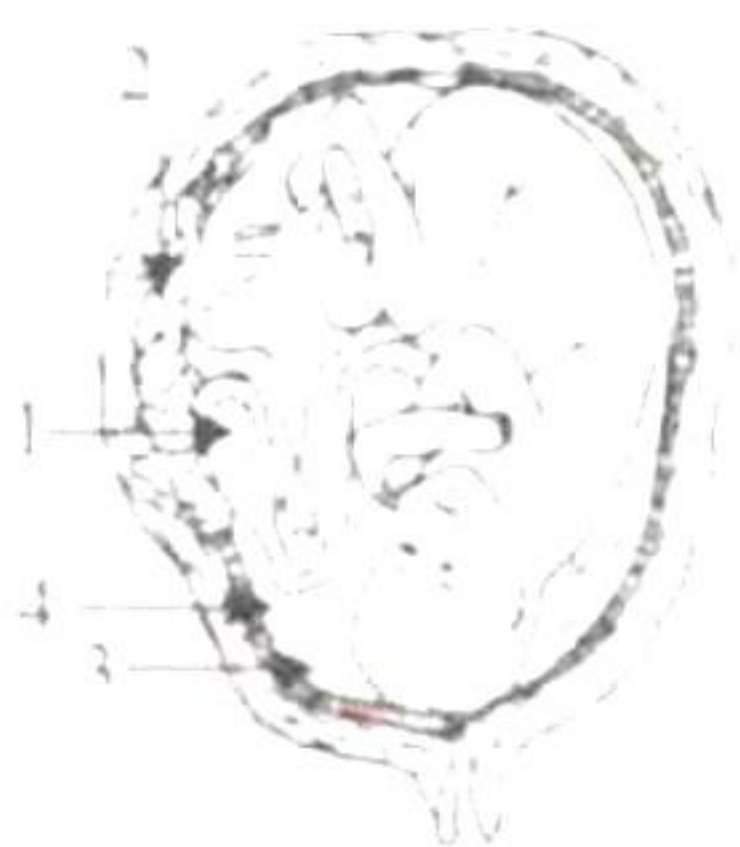
- (i) What would happen if fertilisers were sprinkled near the root hair in the soil? [1]
- (ii) [2]
  - (a) What are the two sources that form the placenta?
  - (b) List any two substances which pass from the foetus to the mother through the placenta.
- (iii) State two disadvantages of transpiration. [2]
- (iv) Mention two effects of radioactive pollution on human health. [2]
- (v) The figure given below is a diagrammatic representation of the cross-section of the root in the root hair zone. Study the same and then answer the questions which follow: [3]



- (a) Name the parts labelled 1-5.
- (b) What pressure is responsible for the movement of water in the direction indicated by the arrows?
- (c) How is this pressure set up?

### Question 7

- (i) Why are roots said to be negatively phototropic? [1]
- (ii) Write the full form of: [2]
  - (a) DDT
  - (b) PAN
- (iii) Distinguish between presbyopia and astigmatism. [2]
- (iv) Give the functions of the following hormones: [2]
  - (a) Oxytocin
  - (b) Thyroxine
- (v) The figure shows a human foetus in the uterus. [3]



- (a) Label the parts 1-4.
- (b) State the functions of parts 2 and 3.
- (c) Briefly explain the respiration of the embryo.



### Question 8

- (i) Injury to the medulla oblongata results in death. [1]
- (ii) Why is there an increasing dependency today on natural sources of energy such as sunlight and wind? [2]
- (iii) Why do gametes have a haploid number of chromosomes? [2]
- (iv) List two measures to control soil pollution. [2]
- (v) Given alongside are two figures (A and B) showing a phenomenon that was first observed in Manchester before and after the year 1850. [3]



- (a) What name has been given to this phenomenon?
- (b) Give the common name and the scientific name of the insect involved in this phenomenon.
- (c) The following phenomenon provides a classical explanation of a scientific theory given by a certain scientist. Give the name of the scientist who gave this theory.



# Solution

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## SECTION A

### Solution 1

- (i) A is False and R is True
- (ii) Systole of the left ventricle
- (iii) Uric acid
- (iv) Pancreas
- (v) Motor neuron
- (vi) Both A and R are True
- (vii) Contraceptive pills
- (viii) A is True and R is False
- (ix) Eardrum
- (x) Osmotic pressure
- (xi) Auxin
- (xii) A is False and R is True
- (xiii) I and II
- (xiv) Peppered moth
- (xv) Round and yellow

### Solution 2

#### (i)

- (a) Seminal vesicles
- (b) Osmosis
- (c) Mercury
- (d) Ganong's potometer
- (e) Glucose

#### (ii)

- (a) Incorrect term - Ureter, Correct term - Urethra  
Seminiferous tubule → Sperm → Sperm duct → Accessory glands → Semen → Urethra.
- (b) Incorrect term - Epidermis, Correct term - Endodermis  
Soil water → Root hair → Cells of cortex → Endodermis → Xylem.
- (c) Incorrect term - 2 ATP, Correct term - 38 ATP  
Oxygen → Stoma → Respiratory cavity → Mesophyll cells → Oxidation of glucose → 38 ATP.
- (d) Incorrect term - Auditory nerve, Correct term - Optic nerve  
Pupil → Eye lens → Vitreous humour → Fovea → Optic nerve.



- (e) Incorrect term - Receptor, Correct term - Effector  
Sensory nerve → Dorsal root ganglion → Sensory neuron → Motor neuron → Effector.

**(iii)**

- (a) The type of lens used to correct myopia is concave.  
(b) The basic unit of the nervous system is the neuron.  
(c) Sperms are produced in the seminiferous tubule.  
(d) A non-degradable pollutant is DDT.  
(e) The period of complete development of the foetus till birth is termed as gestation.

**(iv)**

- (a) Bone marrow: Site for the formation of blood corpuscles.  
(b) Meninges: Protects the brain from mechanical injuries and jerks.  
(c) Thick cuticle: Avoids excessive transpiration.  
(d) Cerebellum: Coordinates muscular activity and body balance.  
(e) Collecting duct: Pours urine in the pelvis of the kidney.

**(v)**

Column I	Column II (Answers)
1. Testosterone	c) Leydig cells
2. Renal artery	e) Contains more urea
3. Semicircular canals	a) Help in balancing while the body is in motion
4. Progesterone	b) Corpus luteum
5. Sickle-cell anaemia	d) Defective haemoglobin in RBCs

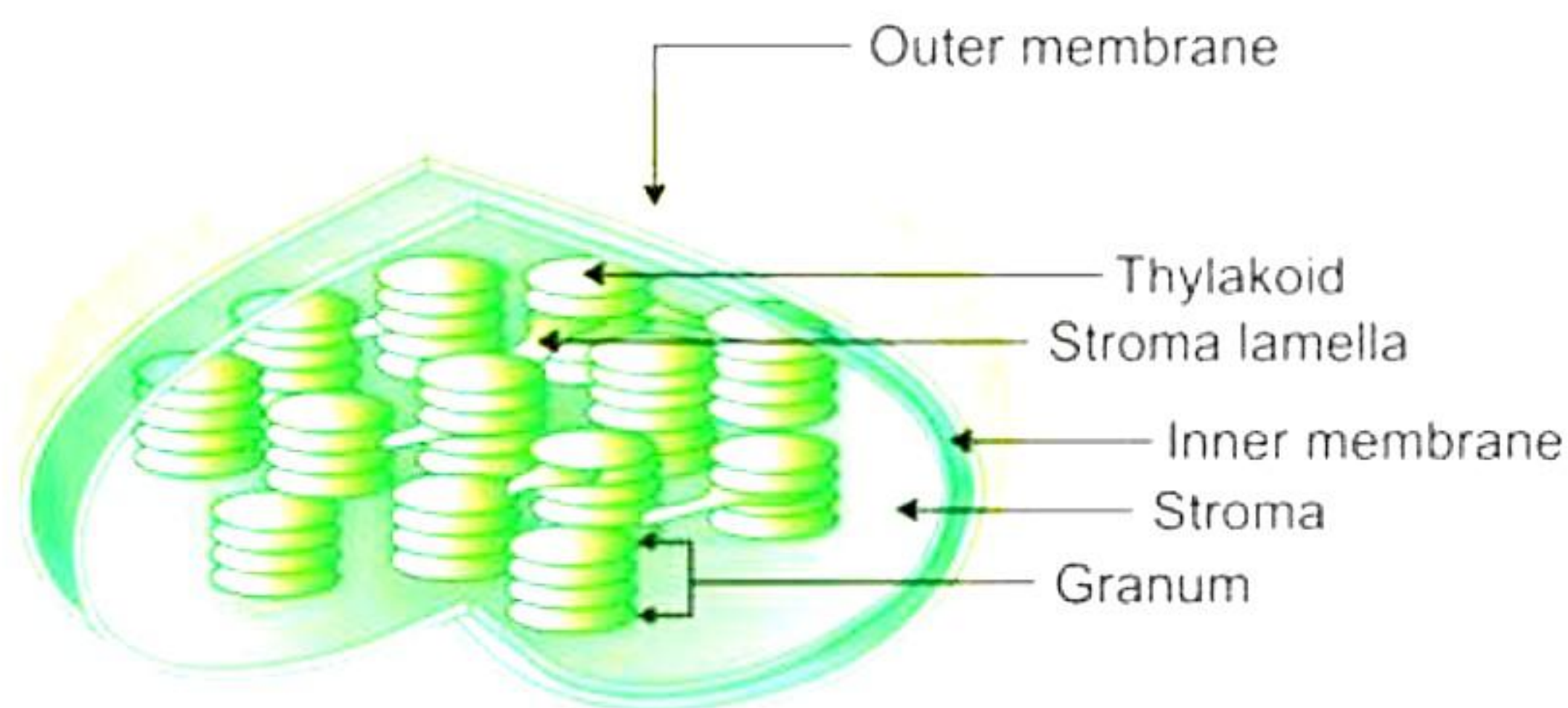


## SECTION B

### Solution 3

- (i) Ciliary muscles present in the choroid, change, or regulate the shape of the eye lens.
- (ii) The heart pushes the blood directly into the arteries with great force and pressure, and then relaxes for a while during joint diastole and then again pushes the blood into the arterial system. Therefore, the blood in the arteries flows in spurts.

### (iii) Chloroplast



### (iv) Reasons for the rapid increase in the population of India:

1. Illiteracy: Most of the rural population, which forms the bulk of our society, is still illiterate, ignorant, and superstitious. They also do not know the functioning of the human reproductive system.
2. Traditional Beliefs: Among the people from the lower strata of the society, children are regarded as a gift of God and a sign of prosperity. Therefore, they make no effort to avoid pregnancy.

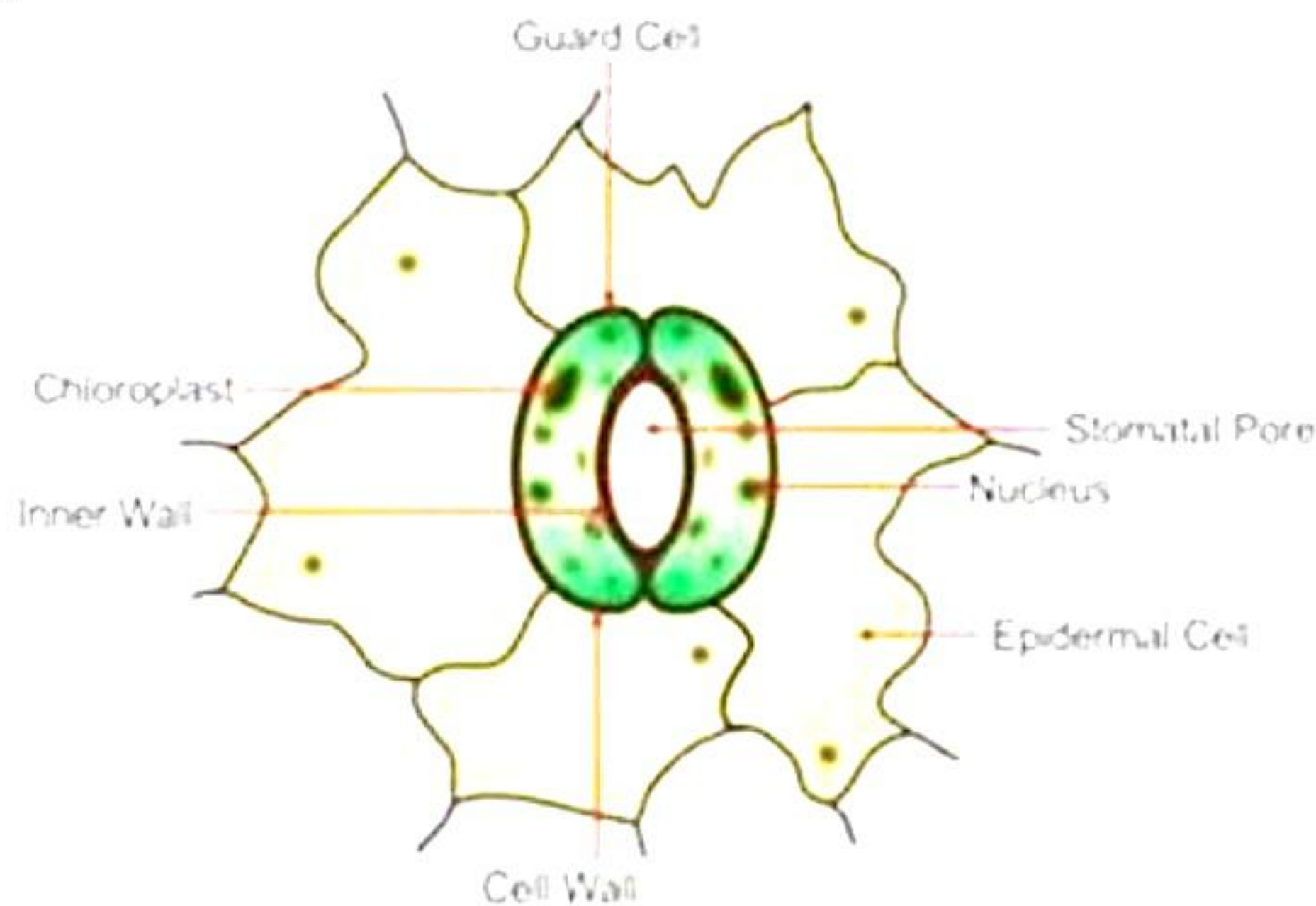
### (v)

- (a) The aim of the experiment is to show that light is necessary for photosynthesis.
- (b) After the experiment, part A and part B show blue-black colour. This is because parts A and B are exposed to sunlight and thus, starch is produced in these parts. As a result, these parts show positive starch test.
- (c) Part C shows brown colour because it is covered with black paper before the experiment. This part of the leaf does not undergo photosynthesis, and due to the absence of starch, it gives a negative starch test.



#### Solution 4

- (i) The process of formation of ATP from ADP by the addition of one phosphate group using electrons in the presence of light is called photophosphorylation.
- (ii) When the sound waves strike the ear drum, it vibrates to produce sound and transmits these vibrations to the ear ossicles and the inner ear. Using a sharp object may rupture the ear drum. Therefore, it is harmful to use a sharp object to remove wax from the ear.
- (iii) Open stomata



- (iv) In summer, we lose a considerable part of the water through perspiration. As a result, the kidneys have to reabsorb more water from the glomerular filtrate making the urine concentrated. Thus, we urinate fewer times in summer than in winter and the urine passed is generally thicker.
- (v)
  - (a) Adrenal gland.
  - (b) 1 - Adrenal cortex  
2 - Adrenal medulla
  - (c) Adrenal gland is situated on the top of both the kidneys like a cap.

#### Solution 5

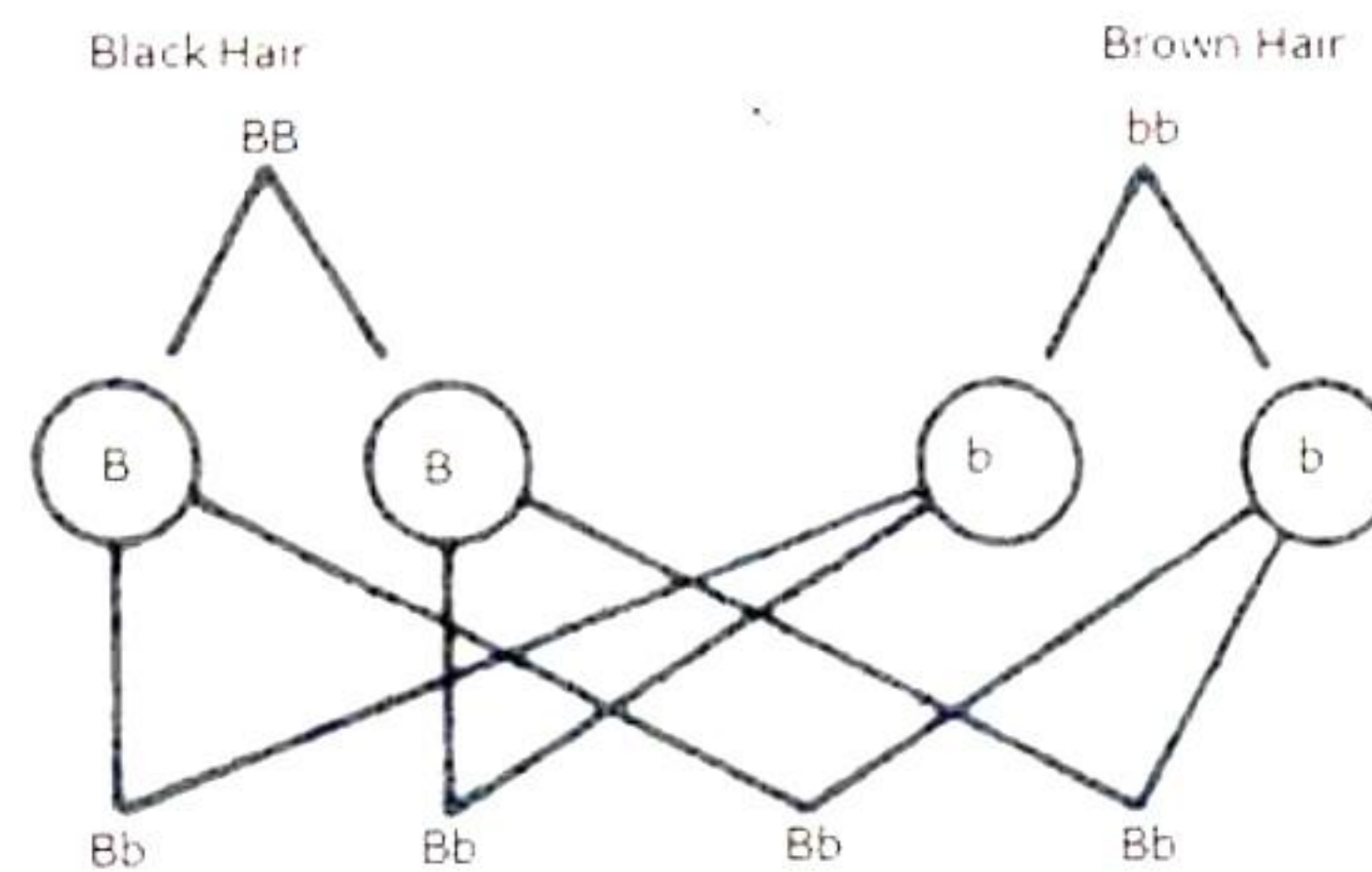
- (i) Tubectomy in females and vasectomy in males.
- (ii) The salt concentration in the body of marine fish is greater than that in tap water. If marine fish are placed under tap water, water enters the fish body due to the concentration gradient between the fish and tap water. The fish become more turgid and finally burst, leading to their death.



(iii) Dialysis involves the use of artificial kidney or a dialysis machine. The patient's blood from the radial artery is led through the machine where excess salts and urea are removed. The purified blood is then returned to a vein in the same arm.

Dialysis is carried out in case of failure of both the kidneys. In case there is a permanent damage in the kidneys, then dialysis must be repeated for about 12 hours twice a week.

(iv) Father – Black Hair – BB  
Mother – Brown hair - bb



In the  $F_1$  generation, all the offspring will be heterozygous for black hair.

(v)

- (a) A – Erythrocytes  
B – Leucocytes  
C - Thrombocytes

(b) Erythrocytes (A): Supply oxygen to the cells of the body.

Leucocytes (B): Play an important role in the immunity of the body by producing antibodies or by performing phagocytosis.

Thrombocytes (C): Help in the coagulation of blood.

(c) Characteristics of Leucocytes (B):

1. They have pseudopodia to catch and engulf microorganisms.
2. They show amoeboid movement so that they can squeeze out of the blood capillaries and reach the site of infection in a short period of time.

### Solution 6

(i) If fertilisers were sprinkled near the root hair in the soil, exosmosis would take place and the water will move out of the root hair. Thus, the root hair would become flaccid.

(ii)

(a) Placenta is formed by two sets of minute finger-like processes called the villi. One set of villi is from the uterine wall and the other set is from the allantois.

(b) Oxygen and amino acids.

(iii) Disadvantages of transpiration:

1. It causes stunted growth in plants.
2. Plants wilt on a hot and bright sunny day, which may sometimes result in death.



(iv) Effects of radioactive pollution on human health:

- It may cause cancers such as leukaemia.
- It affects the functioning of the cell membrane and cell enzymes.

(v)

(a) 1 - Root hair

2 - Soil particles

3 - Xylem

4 - Cortex

5 - Nucleus

(b) Root pressure and osmotic pressure.

(c) The pressure is set up by the alternate turgidity and flaccidity of the cells which help to move the cell sap upwards due to osmotic pressure. This creates root pressure which ultimately helps to absorb water.

### **Solution 7**

(i) The movement of a plant part away from the direction of sunlight is called negative phototropism. Roots when exposed to sunlight tend to grow away from it in the downward direction. As a result, roots are said to be negatively phototropic.

(ii)

(a) DDT: Dichlorodiphenyltrichloroethane

(b) PAN: Peroxyacetyl nitrate

(iii) Presbyopia occurs in old people where the lens loses its flexibility resulting in far-sightedness.

Astigmatism is an eye defect in which some parts of the object are seen in focus while others are blurred. It arises due to the uneven curvature of the cornea.

(iv)

(a) Oxytocin: It stimulates vigorous contractions of the uterine muscles during childbirth. It also stimulates milk ejection.

(b) Thyroxine: It regulates the basal metabolism rate, i.e., the rate of cellular oxidation resulting in heat production at rest. In children, it is also responsible for growth.

(v)

(a) 1 - Umbilical cord

2 - Placenta

3 - Amniotic fluid

4 - Amnion

(b) Placenta (Part 2): Protects the foetus and provides nourishment and oxygen and removes urea through the umbilical cord.

Amniotic fluid (Part 3): Acts as a shock absorber and protects the foetus from mechanical jerks.



- (c) The blood of the foetus is in close contact with the mother's blood. Oxygen and nutrients diffuse from the mother's blood to the foetus' blood and CO<sub>2</sub> diffuses from the foetus' blood to the mother's blood.

### **Solution 8**

- (i) The medulla oblongata regulates the involuntary activities of the body such as heartbeat, breathing rate, saliva secretion, and gut peristalsis. Injury to the medulla oblongata can disturb or halt these activities resulting in death.
- (ii) Increasing population has already out pressured the limited resources of fossil fuels. It takes millions of years for the formation of fossil fuels. To conserve the limited resources of fossil fuels, there is an increasing dependency today on natural sources of energy such as sunlight and wind.
- (iii) Gametes are formed by the process of meiosis. Meiosis is responsible for maintaining a constant number of chromosomes in a species. During fertilisation, if the gametes with half the number of chromosomes are fused, then the chromosome number is restored in the zygote. Therefore, gametes have a haploid number of chromosomes.
- (iv) Measures to control soil pollution:
- Domestic and commercial wastes should be disposed in sanitary landfills, on vacant lands, where wastes are collected in layers, and then covered with soil.
  - Use of incinerators must be mandatory for biomedical use.
  - Use vermicompost or green manure in place of chemical fertilisers.
- (v)
- (a) Industrial melanism
- (b) Common name: Peppered moth  
Scientific name: *Biston betularia*
- (c) Charles Darwin

## **X - ICSE BOARD - 2018**

**Date: 26.03.2018**

### **Biology - Question Paper Solutions**

#### **SECTION - I (40 Marks)**

*Attempt all questions from this Section*

#### **Question 1**

(a) Name the following :

- (i) The organization which procures and supplies blood during an emergency.
- (ii) The blood vessel which supplies blood to the liver.
- (iii) The number of chromosomes present in a nerve cell of a human being.
- (iv) The layer of the eyeball that forms the transparent Cornea.
- (v) The wax-like layer on the epidermis of leaves which reduces transpiration.

Ans. (i) Red Cross

(ii) Hepatic artery

(iii) 46 (23 pairs)

(iv) Sclerotic layer (Sclera)

(v) Cuticle

(b) Choose the correct answer from each of the four options given below:

(i) The number of Spinal nerves in a human being are :

- (A) 31 pairs      (B) 10 pairs      (C) 21 pairs      (D) 30 pairs

Ans. (A) 31 pairs

(ii) Which one of the following is non-biodegradable?

- (A) DDT                      (B) Vegetable peel      (C) Cardboard              (D) Bark of trees

Ans. (A) DDT

(iii) Aqueous humour is present between the :

- (A) Lens and Retina                                      (B) Iris and Lens  
(C) Cornea and Iris                                      (D) Cornea and Lens

Ans. (D) Cornea and Lens

(iv) A strong chemical substance which is used on objects and surfaces in our surroundings to kill germs:

- (A) Cresol                      (B) Carbolic acid      (C) Iodine                      (D) Mercurochrome

Ans. (A) Cresol

(v) Which one of the following is a Greenhouse gas?

- (A) Oxygen                      (B) Methane                      (C) Sulphur dioxide      (D) Nitrogen

Ans. (B) Methane

(c) Complete the following paragraph by filling in the blank (i) to (v) with appropriate words:

To test a leaf for starch, the leaf is boiled in water to (i) \_\_\_\_\_. It is then boiled in Methylated spirit to (ii) \_\_\_\_\_. The leaf is dipped in warm water to soften it. It is placed in a petri dish, and (iii) \_\_\_\_\_ solution is added. The region of the leaf which contains starch, turns (iv) \_\_\_\_\_ and the region while does not contain starch, turns (v) \_\_\_\_\_.

Ans. (i) to kill the cells.

(ii) remove the chlorophyll

(iii) Iodine solution

(iv) blue-black in colour

(v) brown

- (d) Match the items given in Column A with the most appropriate ones in Column B and rewrite the correct matching pairs.

**Column A**

- (i) Cretinism
- (ii) Diabetes insipidus
- (iii) Exophthalmic Goitre
- (iv) Adrenal virilism
- (v) Dwarfism

**Column B**

- (a) Hypersecretion of adrenal cortex
- (b) Hyposecretion of Thyroxine
- (c) Hyposecretion of growth hormone
- (d) Hyposecretion of Vasopressin
- (e) Hyposecretion of adrenal cortex
- (f) Hypersecretion of Growth hormone
- (g) Hypersecretion of Thyroxine

- Ans. (i) Cretinism : Hyposecretion of Thyroxine
- (ii) Diabetes insipidus : Hyposecretion of Vasopressin
- (iii) Exophthalmic Goitre : Hypersecretion of Thyroxine
- (iv) Adrenal virilism : Hypersecretion of adrenal cortex
- (v) Dwarfism : Hyposecretion of growth hormone

- (e) Correct the following statements by changing the underlined words:

- (i) Normal pale yellow colour of the urine is due to the presence of the pigment Melanin.
- (ii) The outermost layer of Meninges is Pia mater.
- (iii) The cell sap of root hair is Hypotonic.
- (iv) Xylem transports starch from the leaves to all parts of the plant body.
- (v) Nitrogen bonds are present between the complementary nitrogenous bases of DNA.

- Ans. (i) Urochrome

- (ii) Dura mater

- (iii) Hypertonic

- (iv) Phloem

(v) Hydrogen bonds

(f) Choose between the two options to answer the question specified in the brackets for the following:

An example is illustrated below.

Example: Corolla or Calyx (Which is the miter whorl ?) Answer : Calyx

(i) Blood in the renal artery or renal vein (Which one has more urea ?)

(ii) Perilymph or endolymph (Which one surrounds the organ of Corti ?)

(iii) Lenticels or stomata (Which one remains open always ?)

(iv) Sclerotic layer or choroid layer. (Which one forms the Iris ?)

(v) Blood in the pulmonary artery or pulmonary vein (Which one contains less oxyhaemoglobin ?)

Ans. (i) Renal artery

(ii) Endolymph

(iii) Lenticels

(iv) Choroid layer

(v) Pulmonary artery

(g) Given below is a representation of a type pollution.

Study the picture and answer the questions :





- (i) Name the type of pollution shown in the picture.
- (ii) Name one source of this pollution.
- (iii) How does this pollution affect human health ?
- (iv) Write one measure to reduce this pollution.
- (v) State one gaseous compound that leads to the depletion of the ozone layer and creates 'Ozone holes'.

Ans.

- (i) Air pollution
- (ii) Smoke from vehicles
- (iii) Air pollution results in respiratory problems, lung disorders etc.
- (iv) (A) Use of unleaded petrol and of CNG.  
(B) Switching off automobile engines at red lights and when not in use.
- (v) CFC's (chlorofluorocarbons) released from refrigerators, aerosol-sprayers etc.

(h) Choose the ODD one out from the following terms given and name the CATEGORY to which the others belong :

- (i) Detergents, X-rays, sewage, oil spills
- (ii) Lumen, muscular tissue, connective tissue, pericardium
- (iii) Dendrites, Medullary sheath, Axon, Spinal cord
- (iv) Centrosome, Cell wall, Cell membrane, Large vacuoles
- (v) Prostate gland, Cowper's gland, seminal vesicle, seminiferous tubules.

Ans.

- (i) X-rays (Chemical pollutants)
- (ii) Lumen (All others are connective tissues)
- (iii) Spinal cord (Parts of nerve cell)
- (iv) Centrosome (Organelles in Plant cell)
- (v) Seminiferous tubules (Others are Accessory glands in male reproductive system)

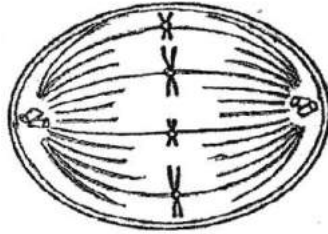
## SECTION - II (40 Marks)

*Attempt any four questions from this Section*

### Question 2

- (a) The diagram given below represents a stage during cell division.

Study the same and answer the questions that follow:



- (i) Identify whether it is a plant cell or an animal cell.

Give a reason in support of your answer.

- (ii) Name the stage depicted in the diagram.

What is the unique feature observed in this stage?

- (iii) Name the type of cell division that occurs during :

1. Replacement of old leaves by new ones.
2. Formation of gametes.

- (iv) What is the stage that comes before the stage shown in the diagram?

- (v) Draw a neat, labelled diagram of the stage mentioned in (iv) above keeping the chromosome number constant.

Ans. (i) Animals cell. Because it lacks cell-wall.

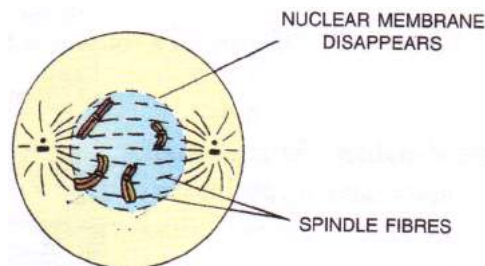
- (ii) Metaphase. Chromosomes lined up in one plane at equator.

- (iii) 1. Mitotic cell division

2. Meiosis (Reductional) cell division

- (iv) Prophase comes before metaphase.

- (v)



**Prophase**

(b) Mention the exact location of the following :

- (i) Epididymis
- (ii) Lacrimal gland
- (iii) Malleus
- (iv) Hydathodes
- (v) Pulmonary semilunar valve

Ans. (i) Male reproductive system

(ii) Eyes

(iii) Middle ear

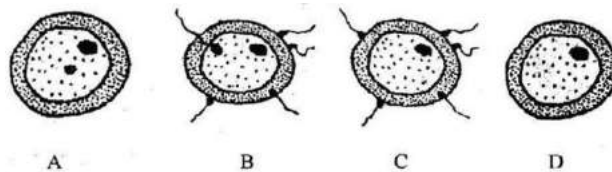
(iv) Leaf of plants

(v) At the opening of pulmonary trunk in right ventricle

### Question 3

(a) Given below are diagrams showing the different stages in the process of fertilisation of an egg in the human female reproductive tract.

Study the diagrams and answer the questions:



(i) Arrange the letters given below each diagram in a logical sequence to show the correct order in the process of fertilisation.

(ii) Where does fertilisation normally take place?

What is 'Implantation' that follows fertilisation?

(iii) Mention the chromosome number of the egg and zygote in humans.

(iv) Explain the term 'Gestation'. How long does Gestation last in humans?

(v) Draw a neat, labelled diagram of a mature human sperm.

Ans. (i) D-C-B-A

(ii) Ampullary - Isthmic junction in fallopian tubes

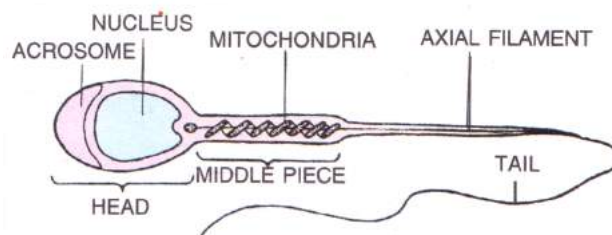
Implantation is a attachment of the developing foetus (blastocyst) to endometrium

(iii) Egg is haploid (23)

Zygote is diploid (46)

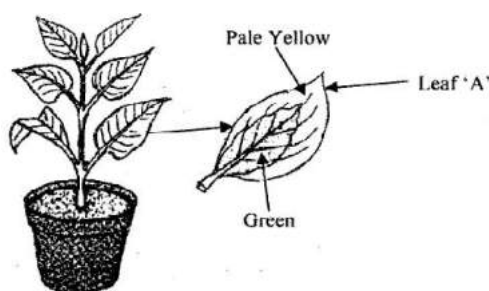
(iv) The intrauterine period of foetus in mother's body or the period from zygote to fully formed foetus in uterus period is gestation period. It is about 280 days (9 months + 7 days approximately)

(v)



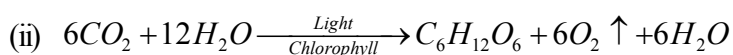
**Human Sperms**

- (b) A potted plant with variegated leaves was taken in order to prove a factor necessary for photosynthesis. The potted plant was kept in the dark for 24 hours and then placed in bright sunlight for a few hours. Observe the diagrams and answer the questions.



- What aspect of photosynthesis is being tested in the above diagram?
- Represent the process of photosynthesis in the form of a balanced equation.
- Why was the plant kept in the dark before beginning the experiment ?
- What will be the result of the starch test performed on Leaf 'A' shown in the diagram ? Give an example of a plant with variegated leaves.
- Draw a neat labelled diagram of a chloroplast.

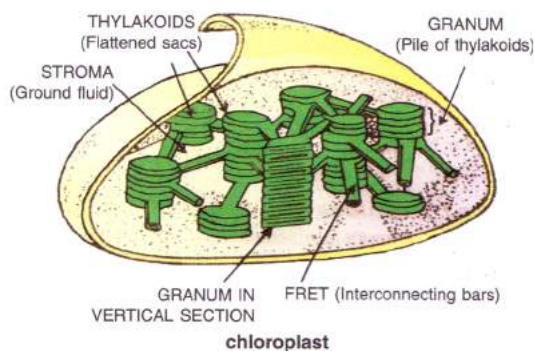
Ans. (i) To show that chlorophyll is necessary for photosynthesis.



(iii) To destarch the leaves.

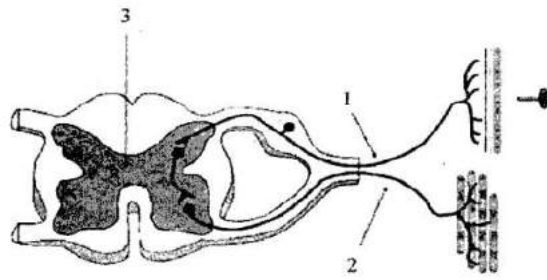
(iv) It will not turn blue. Example of plants with variegated leaves is Oxalis species.

(v)



#### Question 4

- (a) The diagram given below shows the internal structure of a spinal cord depicting a phenomenon. Study the diagram and answer the questions:



- (i) Name the phenomenon that is depicted in the diagram. Define the phenomenon.
- (ii) Give the technical term for the point of contact between the two nerve cells.
- (iii) Name the parts numbered 1, 2 and 3.
- (iv) How does the arrangement of neurons in the spinal cord differ from that of the brain?
- (v) Mention two ways by which the spinal cord is protected in our body.

Ans. (i) Reflex action

Definition - A quick, automatic, involuntary and often unconscious action brought about when the receptors are stimulated by external or internal stimuli.

(ii) Synaptic - Junction

(iii) 1 = Sensory neuron

2 = Motor neuron

3 = Grey matter with central canal of spinal cord

(iv) The grey matter is present in the cortex (outer side) consisting of cell bodies and white matter is present inside, which consists of myelinated axons in the brain.

In spinal cord, the grey matter (cell bodies) are present inside, while white matter (Myelinated axon) is present outside.

(v) Vertebral column, meninges and cerebrospinal fluid (CSF)

(b) Give appropriate biological or technical terms for the following :

- (i) Process of maintaining water and salt balance in the blood.
- (ii) Hormones which regulate the secretion of other endocrine glands.
- (iii) Movement of molecules of a substance from their higher concentration to lower concentration when they are in direct contact.
- (iv) The condition in which a pair of chromosomes carry similar alleles of a particular character.
- (v) The complex consisting of a DNA strand and a core of histones.
- (vi) The onset of menstruation in a young girl.

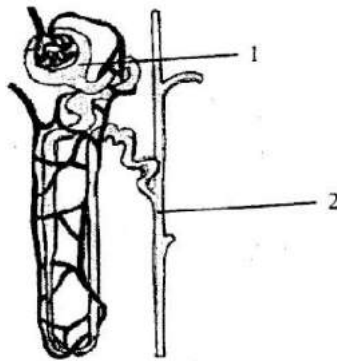


- (vii) Squeezing out of white blood cells from the capillaries into the surrounding tissues.
- (viii) The fluid which surrounds the foetus.
- (ix) The relaxation phase of the heart.
- (x) The difference between the birth rate and the death rate.

- Ans.
- (i) Osmoregulation
  - (ii) Trophic hormones  
(Secreted by hypothalamus and pituitary)
  - (iii) Diffusion
  - (iv) Homozygous
  - (v) Nucleosomes
  - (vi) Menarche
  - (v) Diapedesis
  - (vi) Amniotic fluid
  - (vii) Diastole
  - (viii) Growth rate

### Question 5

- (a) The diagram given below is that of a structure present in a human kidney.  
Study the same and answer the questions that follow:



- (i) Name the structure represented in the diagram.
- (ii) What is the liquid entering part '1' called ?  
Name two substances present in this liquid that are reabsorbed in the tubule.
- (iii) What is the fluid that comes to part '2' called ?  
Name the main nitrogenous waste in it.
- (iv) Mention the three main steps involved in the formation of the fluid mentioned in (iii) above.

- (v) Name the substance which may be present in the fluid in part '2' if a person suffers from *Diabetes mellitus*.

Ans.(i)Nephron

- (ii) (1) Glomerular filtrate  
(2) Glucose and Amino acids

- (iii) (1) Urine  
(2) Urea

- (iv) The 3 steps are  
(1) Ultrafiltration  
(2) Selective Reabsorption  
(3) Tubular secretion

- (v) Glucose

- (b) Differentiate between the following pairs on the basis of what is indicated in the brackets.
- (i) Leaf and Liver [form in which glucose is stored]
  - (ii) ATP and AIDS [expand the abbreviations]
  - (iii) Testosterone and Oestrogen [organ which secretes]
  - (iv) Ureter and Urethra [function]
  - (v) Hypotonic solution and Hypertonic solution [condition of a plant cell when placed in them]

Ans. (i) Leaf - Starch

Liver - Glycogen

- (ii) ATP – Adenosine triphosphate

AIDS – Acquired Immunodeficiency Syndrome

(iii) Testosterone – Testis

Oestrogen – Ovaries

(iv) Ureter – Transport of urine from kidneys to urinary bladder.

Urethra – Transport of urine from urinary bladder to outside.

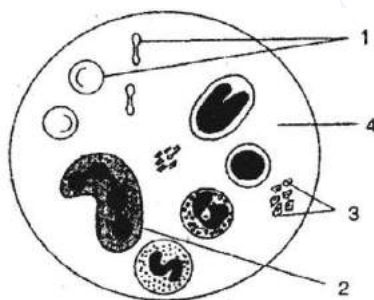
(v) Hypotonic solution – Turgid

Hypertonic solution – Flaccid

### Question 6

(a) Given below is a diagram of a human blood smear.

Study the diagram and answer the questions that follow:



- (i) Name the components numbered '1' to '4'.
- (ii) Mention two structural differences between the parts '1' and '2'.
- (iii) Name the soluble protein found in part '4' which forms insoluble threads during clotting of blood.
- (iv) What is the average lifespan of the component numbered '1'?
- (v) Component numbered '1' do not have certain organelles but are very efficient in their function. Explain.

Ans. (i) 1. RBC

2. Neutrophil

3. Blood platelets

4. Blood plasma

(ii) **RBC**

- Biconcave, disc shaped
- Do not have nucleus

**Neutrophil**

- Amoeboid
- Have 3-5 lobbed nucleus.

(iii) Fibrinogen

(iv) 120 days

(v) RBCs do not have nucleus, endoplasmic reticulum and mitochondria. They are very efficient in carrying nutrients like glucose (which they cannot use, due to lack of mitochondria), can easily pass through the capillaries (lack of endoplasmic reticulum - endoskeleton)

(b) Give biological explanations for the following:

(i) Education is very important for population control.

(ii) The placenta is an important structure for the development of a foetus.

(iii) All the food chains begin with green plants.

(iv) Plants growing in fertilized soil are often found to wilt if the soil is not adequately watered.

(v) We should not put sharp objects into our ears.

Ans. (i) The married couples should be educated to delay birth of their first child, to space the second with a sufficient interval for proper upbringing and to stop the third.

(ii) The placenta allows diffusion of food and oxygen from mother to foetus and that of nitrogenous waste and  $CO_2$  from foetus to mother.

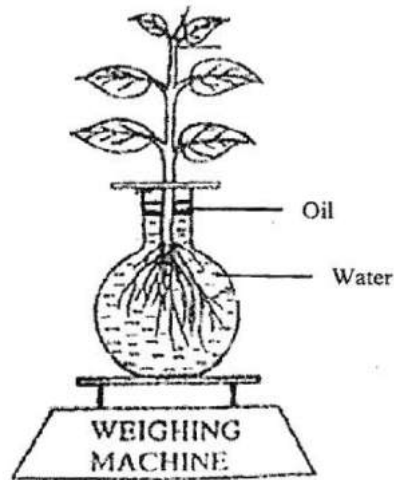
(iii) Green plants are the only organisms that are able to synthesize food from  $CO_2$  and  $H_2O$  in presence of chlorophyll and sunlight. However, animals depend upon plants for food. Therefore, all food chains begin with green plants.

(iv) Plants growing in fertilized soil are often found to wilt, if the soil is not adequately watered because of flaccidity or a decrease in turgor pressure exerted by the absorbed water on the cell wall of plants.

(v) We should not put sharp objects into our ears, as it may damage the ear drum.

### Question 7

- (a) The diagram below represents a process in plants. The setup was placed in bright sunlight. Answer the following questions:



- (i) Name the physiological process depicted in the diagram.  
Why was oil added to the water?
- (ii) When placed in bright sunlight for four hours, what do you observe with regard to the initial and final weight of the plant? Give a suitable reason for your answer.
- (iii) What happens to the level of water when this setup is placed in:
  1. Humid conditions ?
  2. Windy conditions ?
- (iv) Mention any three adaptations found in plants to overcome the process mentioned in (i).
- (v) Explain the term 'Guttation'.

Ans. (i) 1. Transpiration  
2. Oil was added to the water to prevent its evaporative loss.

- (ii) Upon exposure to bright sunlight for four hours; the final weight will be lesser than the initial weight; because some water will be lost from the aerial parts of the plant by transpiration.

- (iii) 1. No change in the level of water  
2. The level of water drops.



(iv) The three adaptations found in plants to overcome transpiration are:

1. Sunken stomata: The stomata may be sunken or covered by hairs (eg. *Nerium*)
2. Narrow leaves: The leaves may become narrower to reduce surface area.
3. Fewer stomata: The number of stomata may be reduced.

(v) The leaves of certain plants exhibit droplets of water along their margins in the morning. This particularly happens in plants growing in warm humid conditions. A humid environment hampers transpiration while the roots continue to absorb water from the soil. This builds up a high hydrostatic pressure within the plant and “forces out” the excess water directly from the tips of veins in the leaf by a process called guttation.

(b) A pea plant which is homozygous for green pods which are inflated [GGII] is crossed with a homozygous plant for yellow pods which are constricted [ggii]. Answer the following questions;

(i) Give the phenotype and genotype of the F<sub>1</sub> generation.

Which type of pollination has occurred to produce F<sub>1</sub> generation?

(ii) Write the phenotypic ratio of the F<sub>2</sub> generation.

(iii) Write the possible combinations of the gametes that can be obtained if two F<sub>1</sub> hybrid plants are crossed.

(iv) State Mendel's law of 'Segregation of Gametes'.

(v) What is the scientific name of the plant which Mendel used for his experiments on inheritance?

Ans. (i) (1) Phenotype of F<sub>1</sub> generation: Pea plants with green and inflated pods.

(2) Genotype of F<sub>1</sub> generation: GgIi

(3) Artificial cross pollination has occurred to produce the F<sub>1</sub> generation.

(ii) The phenotypic ratio of the F<sub>2</sub> generation is 9 : 3 : 3 : 1.

(iii) The possible combination of gametes that can be obtained if two F<sub>1</sub> hybrid plants are crossed are as follows:

GI, Gi, gI, gi.

(iv) The two members of a pair of factors separate during the formation of gametes. This is the Mendel's law of 'Segregation of Gametes'.

(v) *Pisum sativum*

**ICSE Board Class X**

**Biology Board Paper 2019**

**(Two hours)**

**General Instructions:**

**Total Marks: 80**

*Answers to this paper must be written on the paper provided separately*

*You will not be allowed to write during the first 15 minutes.*

*This time is to be spent in reading the question paper*

*The time given at the head of the paper is the time allowed for writing the answers.*

Attempt **all** questions from **Section I** and **any four** questions from **Section II**.

The intended marks for questions or parts of questions are given in brackets [ ].

**SECTION I (40 Marks)**

(Attempt all questions from this section)

**Question 1**

**(a) Name the following: [5]**

**i) The layer of the eyeball that provides nourishment to the eye.**

Ans: choroid

**(ii) One gaseous compound which depletes the ozone layer.**

Ans: Chloro fluoro carbons

**(iii) The structure which connects the placenta and the foetus.**

Ans-umbilical chord

**(iv) A pair of corresponding chromosomes of the same shape and size and derived one from each parent.**

Ans: Homologous chromosome

**(v) The compound formed when hemoglobin combines with carbon dioxide in blood.**

Ans: Carbamino hemoglobin

**(b) Correct and rewrite the statements by changing the biological term that is underlined for each statement. [ 5]**

**(i) The theory of inheritance of acquired characters was proposed by Watson and Crick.**

Ans-The theory of inheritance of acquired characters was proposed By J.B.Lamarck.

**(ii) The protective sac which develops around the developing embryo is called the pericardium.**

Ans-The protective sac which develops around the developing embryo is called the amniotic sac

**(iii) Maintaining balance of the body and coordinating muscular activities is carried out by the cerebrum.**

Ans-Maintaining balance of the body and coordinating muscular activities is carried out by the Cerebellum.

**(iv) The kidney is composed of a number of neurons.**

Ans-The kidney is composed of a number of nephrons.

**(v) The part of the eye which can be donated from a clinically dead person is the retina.**

Ans- The part of the eye which can be donated from a clinically dead person is the cornea.

**(c) Give suitable biological reasons for the following statements: [5]**

**(i) The birth rate in India is very high.**

Ans-Indifferent attitude in birth controlling device .Early marriage, illiteracy are some of the causes of high birth rate in India. The people of rural area are unaware of the need of family planning.

**(ii) Carbon monoxide is dangerous when inhaled.**

Ans- Inhaling too much of carbon monoxide is poisonous.

**(iii) Root hairs become flaccid and droop when excess fertilizers are added to the moist soil around them.**

Ans- In outside soil there is more concentration of solutes due to the presence of fertilizers so water moves from the root hairs cells to the soil through the process of osmosis and root hair becomes flaccid.

**(iv) Acid rain is harmful to the environment.**

Ans- Acid rain causes damage to building and monument. It increases acidity of soil. It causes neurological diseases.

**(v) All life on Earth is supported by photosynthesis.**

Ans-Green plants and some other organism prepare food in presence of sunlight and carbon dioxide by process of photosynthesis. All animals take food from plants and other animals. All animals depend on plants for food to obtain energy.

**(d) Match the items given in Column A with the most appropriate ones in Column B and rewrite the correct matching pairs. [5]**

Column A	Column B
Cranial nerves	Testosterone
Leydig Cells	Natural Reflex
Acetylcholine	12 Pairs
Spinal Nerves	Prolactin
Sneezing	Neurotransmitter
	18 pairs
	31 Pairs
	Conditioned reflex

Column A	Column B
Cranial nerves	12 pairs
Leydig Cells	Testosterone
Acetylcholine	Neurotransmitter

Spinal Nerves	31 pairs
Sneezing	Natural reflex

**(e) Choose the correct answer from the four options given below:**

**(i) While recording the pulse rate, where exactly does a doctor press on our wrist?**

- A. Nerve**
- B. Vein**
- C. Artery**
- D. Capillary**

Ans- Artery

**(ii) In a human male, a sperm will contain**

- A. Both X and Y chromosomes**
- B. Only Y chromosome**
- C. Only X chromosome**
- D. Either X or Y chromosome**

Ans - Both X and Y chromosome

**(iii) A muscular wall is absent in**

- A. Capillary**
- B. Venule**
- C. Arteriole**
- D. Vein**

Ans- Capillary

**(iv) On which day of the menstrual cycle does ovulation take place?**

- A. 5th day**
- B. 28th day**



**C. 14th day**

**D. 1st day**

Ans- 14<sup>th</sup> day

**(v) Which one of the following does not affect the rate of transpiration?**

**A. Light**

**B. Humidity**

**C. Wind**

**D. Age of the plant**

Ans- Age of Plant

**(f) Identify the ODD term in each set and name the CATEGORY in which the remaining of these belong: [5]**

Example: Glucose, starch, cellulose, calcium

Odd term: Calcium Category: Others are different types of carbohydrates.

**i. Addison's disease, Cushing's Syndrome, Acromegaly, Leukemia**

Ans - Leukimia is a cancer of blood cells while the other three are endocrinal disorder.

**ii. Insulin, Adrenaline, Pepsin, Thyroxine**

Ans- pepsin is not seretedby endocrine glands.

**iii. Axon, Dendron, Photon, Cyton**

Ans- Axon ,Dendron,cyton are part of neuron while photon is a light particle.

**iv. Chicken pox, Colour blindness, Haemophilia, Albinism**

Ans-ColourBlindness, Haemophilia, albenism are genetic disorder while chicken pox is a viral infection.

**v. Polythene bag, Crop residue, Animal waste, Decaying vegetable**

Ans- Only polythene bag is non- biodegradable.

**(g) Expand the following biological abbreviations: [5]**

- (i) ABA –Abscicic acid
- (ii) IAA- Indole acetic acid
- (iii) ATP- adenosine triphosphate
- (iv) DNA- Deoxyribonucleic Acid
- (v) TSH – Thyroid Stimulating Hormone

**Study the picture given below and answer the following questions: [5]**



**(i) Identify the type of pollution.**

Ans- Water Pollution

**(ii) Name one pollutant that causes the above pollution.**

Ans- Industrial effluent

**(iii) Mention the impact of this pollution on human health.**

Ans- Large amount of Nitrates are dissolved in the water from industrial waste . It will contaminate the water and cause serious health hazards.

**(iv) State one measure to control this pollution.**

Ans- Factories should treat wastes before releasing into water bodies.

**(v) What is a ‘pollutant’? Explain the term**

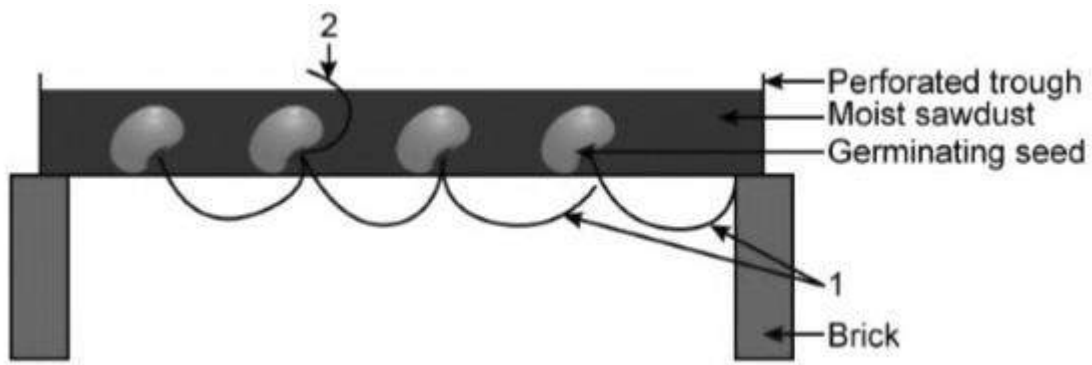
Ans- The substance as certain chemicals or waste that renders the normal properties of environment are called pollutant. They may be air pollutants, Water pollutant, soil pollutants.

## SECTION II (40 Marks)

Attempt any **four** questions from this section.

### Question 2

- a) Given below is an experimental setup to demonstrate a particular tropical movement in germinating seeds. Study the diagram and answer the questions that follows:



- Label the parts 1 and 2.
- Name the tropical movement shown in part 1.
- Part 1 is affected by two stimuli. Which one of the two is stronger?
- What is thigmotropism? Give one Example.
- What is meant by 'positive' and 'negative' tropic movement in plants?

**Ans-**

- Part 1 is radicle and part 2 is plumule.
- Geotropism is shown by Part-1.
- Stimulus of gravity and stimulus of water. Water is stronger stimulus than gravity.

iv) The growth and movements of plants in response to touch is called thigmotropism. These types of movements are seen in tendrils. Tendrils of sweet Pea, grapes when comes in contact with any support it coil around it.

v) Positive tropic movement is the movement of a part of a plant when it grows towards a stimulus. Example: growth of stem towards light.

Negative tropic movement is the movement of a part of plant when it grows away from the stimulus. For Example –movement of root away from the light.

**b) Mention the exact location of each of the following**

**i) Testis-**

Testis are two oval shaped organs in the male reproductive system. They are contained in a sac of skin called scrotum.

**(ii) Incus-**

The incus or anvil is a bone in the middle ear and joined to the stapes or stirrup bone.

**(iii) Thylakoids-**

Chlorophyll is located in a concentrated form in the thylakoid membrane of organelles called chloroplasts.

**(iv) Amniotic fluid-**

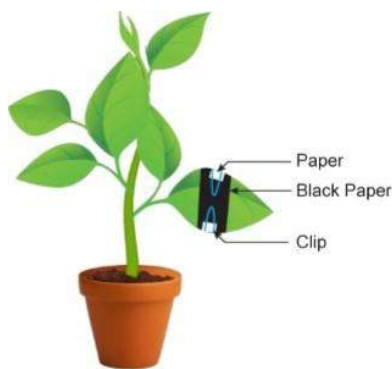
The amniotic fluid is the protective liquid contained by the amniotic sac of a gravid amniote. This fluid serves as a cushion for the growing fetus,

**v) Corpus callosum**

Located near the center of the brain, the Corpus callosum is the largest bundle of nerve fibers that connects the left and right cerebral hemispheres.

**Question 3**

**[a] The diagram given below represents an experiment to prove the importance of a factor in photosynthesis. Answer the questions that follow. [5]**



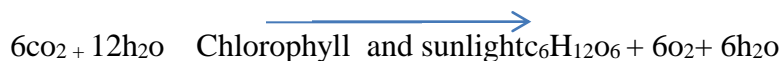
- (i) Name the factor studied in the experiment.
- (ii) What will you observe in experimental leaf after the starch test?
- (iii) Explain the process of photosynthesis.
- (iv) Give a balanced chemical reaction to represent the process of photosynthesis.
- v) Draw a neat labeled diagram of experimental set-up to show that oxygen is released during photosynthesis

Ans-3

a]

- i) Light is necessary for photosynthesis.
- ii) The leaf turns blue black except in covered region which turn brown in colour. As this covered region did not receive light, photosynthesis did not occur and no starch is formed.

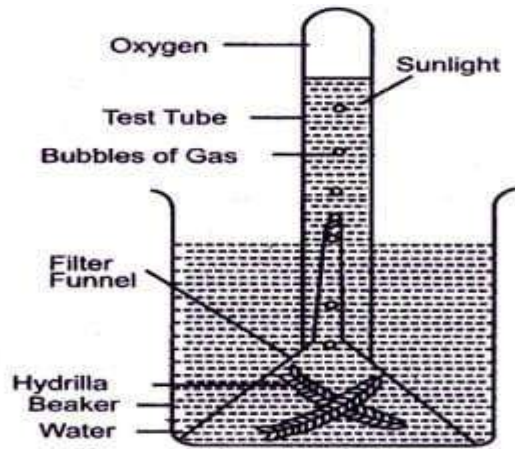
iii) Balanced chemical reaction:



iv) Photosynthesis is a biochemical process by which green plants synthesize their food in presence of carbon dioxide from atmosphere and water from soil in presence of sunlight. Glucose is synthesized during the process which is converted into starch.

v) Experimental setup to show that oxygen is released during photosynthesis.





**b] State the main function of the following: [5]**

i) Medulla Oblongata

ii) Cytokinins

iii) Tears

iv) Coronary Artery

v) Seminal vesicles

**Ans:**

i) Medulla oblongata-

Ans-The primary function of the medulla oblongata is to control autonomic functions throughout the body. It controls functions like heartbeat, breathing and digestion.

(ii) Cytokinins –

Ans-these are plant growth substances that promote cell division and organ formation. It counteract apical dominance.

(iii) Tears

Ans-Tears prevent dryness by coating the surface of the eye, as well as protect it from external irritation. Foreign bodies that enter the eye are washed out by tears.

(iv) Coronary artery

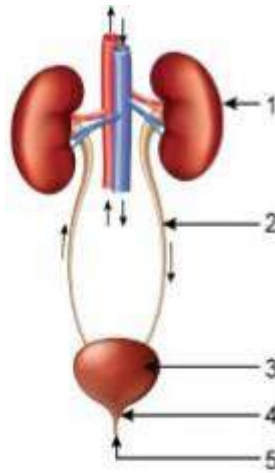
Ans- Coronary arteries supply blood to the heart muscle.

(v) Seminal vesicles –

Ans-The seminal vesicle is responsible for producing a milky fluid called semen. . The thick fluid contains a mixture of substances, including citric acid, proteins, sugar fructose and potassium.

#### Question 4

(a) The diagram given below represents an organ system in the human body. Study the same and answer the questions that follow: [5]



**(I)Identify the system.**

**(ii) Label the parts marked 2 - 4. Mention the function of part 5**

**(iii) Name the structural and functional units of the part marked 1.**

**(iv)What is the fluid that accumulates in part 3? Which is the main nitrogenous waste present in it?**

**vi)Draw a neat labeled diagram showing longitudinal section of part- 1.**

Ans

i)-Human excretory system

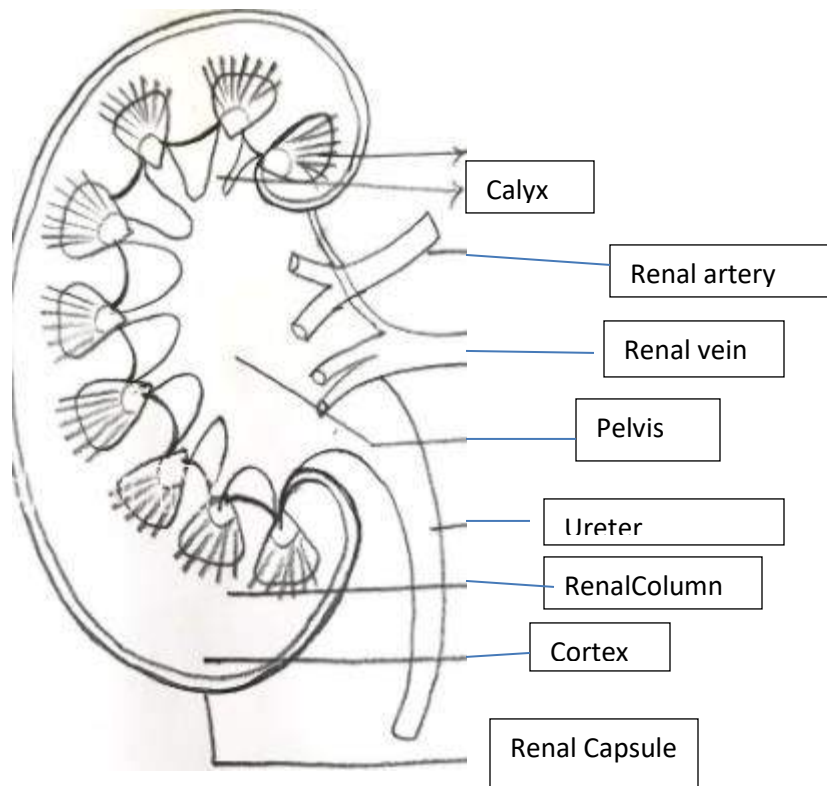
(ii)Part 2 is Ureter and Part 4 is sphincter

(iii)The urethra is a tube responsible for allowing urine to leave the body as it empties from the bladder.

(iv) Nephron is the structural and functional unit of Part-1.

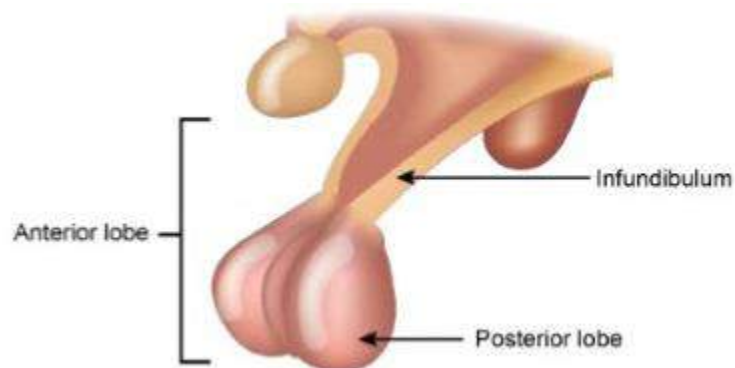
(v) Urine is the fluid that accumulates in part 3. It contains urea and creatinine.

vi) L.S .of Kidney



L. S. of a Kidney

(b) The diagram given below represents an endocrine gland in the human body. Study the diagram and answer the following questions: [5]



(i) Identify the endocrine gland. Where is it located?

ii) Why is the above gland referred to as the 'master gland'?

**(iii) Name the hormone which in deficiency causes diabetes insipidus. How does this disorder differ from diabetes mellitus?**

**(iv) Explain the term 'hormone'. What is the role of tropic hormones in the human body?**

**(v) Which lobe of the above gland secretes**

- **Oxytocin**
- **ACTH**
- **Growth Hormone**

b) Ans-

i) Pituitary Gland. The pituitary is a small gland located below the brain in the skull base below the hypothalamus.

(ii) It is often called the "master gland" because it controls the functions of all other endocrine glands.

lii) Decrease secretion of Anti Diuretic Hormone causes diabetic Insipidus. Diabetic Mellitus is caused due to deficiency of Insulin hormone.

(iv) A hormone is a biological compound used by multicellular organisms to organize, coordinate, and control the functions of their cells and tissues. A tropic hormone stimulates other endocrine gland to release their hormone.

(v) Oxytocin- Posterior pituitary lobe

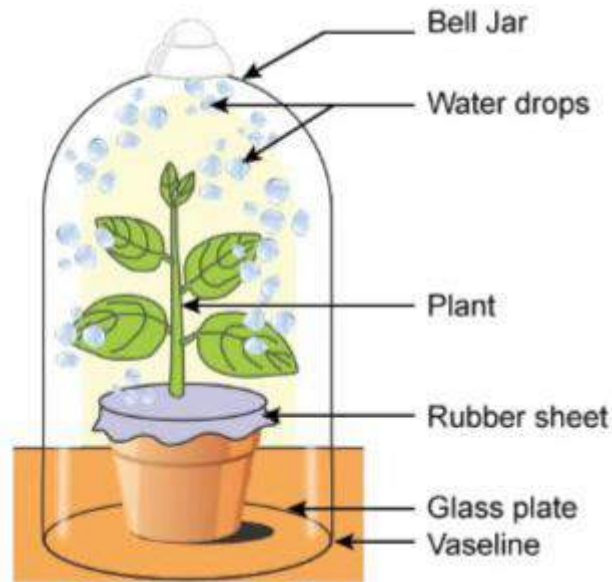
ACTH-Anterior pituitary lobe

Growth hormone - Anterior pituitary lobe

### **Question 5**

**(a) Given below is an apparatus which was set up to investigate a physiological process in plants. The set-up was placed in bright sunlight. Answer the questions that follow: [5]**





- (i) Name the process being studied. Define the process.
- (ii) Why was the pot enclosed in a rubber sheet?
- (iii) Mention two external factors which can accelerate the above process .
- iv) List two adaptations in plants to reduce the above process.
- (v) Draw a neat labelled diagram of a stomatal apparatus.

Ans-

(a)

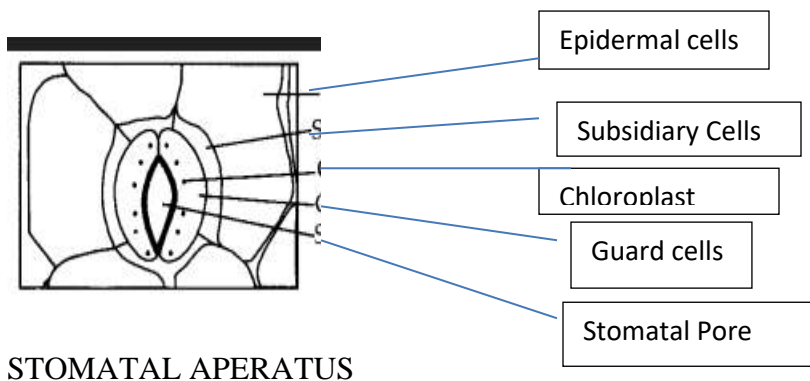
i)Transpiration is taking place. The process by which plant loses water by the process of evaporation through stomata is called transpiration.

(ii) The plastic bag is to prevent the escape of water vapour from the pot.

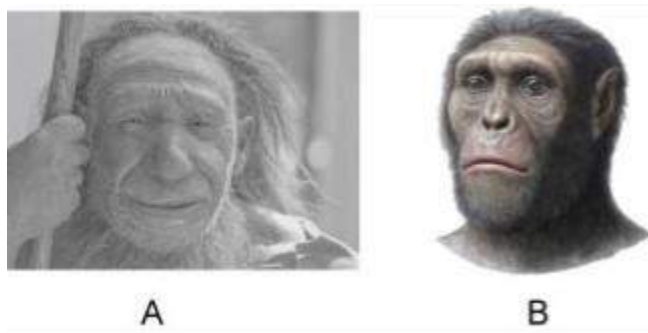
(iii)Transpiration increases with increase in temperature. Wind increases the rate of transpiration. Sunlight also increases the rate of temperature.

iv)Thick cuticle on leaves reduces the loss of water by transpiration. Narrow leaves reduces the exposed surface area for transpiration. Fewer stomata reduces the rate of transpiration.

(v)



(b) Given below are two stages in the evolution of man. Study them and answer the questions that follow: [5]



- (i) Identify Australopithecus and Neanderthal man from the above pictures
- (ii) Mention two characteristic features each for the two stages.
- (iii) Who proposed the theory of 'natural selection'?
- (iv) Name the organism used as an example to explain 'industrial melanism'.
- (v) Give two examples of vestigial organs in humans.

Ans -

(i) A is Neanderthal B is Australopithecus

(ii) Characteristics feature of is Australopithecus:

- Members of *Australopithecus* are a combination of human like and apelike traits.
- Distinct Lumbar curve was present in vertebral column.

Characteristics feature of Neanderthal.

- Neanderthals walk upright with bipedal movement..
- The jaw was deep with no chin and skull bones were thick.

(iii) Charles Darwin proposed the theory of Natural Selection.

(iv) The organism used as an example of Industrial Melanism occurred in Peppered Moth, *Biston Betularia*.

(v) Vermiform Appendix , Wisdom Tooth

### Question 6

In Mendel's experiments, tall pea plants (T) are dominant over dwarf pea plants (t). [5]

(i) What is the phenotype and genotype of the F<sub>1</sub> generation if a homozygous tall plant is crossed with a homozygous dwarf plant?

ii) Draw a Punnett square board to show the gametes and offspring when both parents are heterozygous for tallness.

iii) What is the phenotypic and Genotypic ratio of above cross in (ii)

iv) State Mendel's Law of Dominance.

(v) What is a dihybrid cross?

**Ans**

**(a)**

(i) Phenotypic Ratio :- tall

genotypic ratio : Tt

	T	t
T	TT	Tt

(ii)

t	Tt	tt
---	----	----

(iii) Phenotypic Ratio 3 : 1

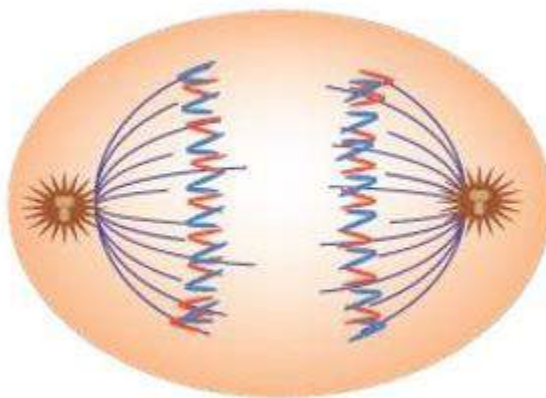
Genotypic Ratio 1: 2 : 1

(iv) Mendel's Law of Dominance.

This when two alternating forms of traits or characters are present in an organism only one factor expresses itself in F1 progeny. The factor that expresses itself is called dominant factor and the other factor which remain hidden is called recessive factor.

v) A dihybrid cross is a breeding experiment between parental generation organisms that differ in two traits.

**(b) Given below is a diagram representing a stage during mitotic cell division. Study the diagram and answer the following questions. [5]**



**(i) Identify the stage by giving a suitable reason.**

**(ii) Is it a plant or an animal cell?. Give a reason to support your answer.**

**(iii) Draw a neat, labelled diagram of the stage which follows the one shown in the diagram.**

**(iv) How many chromosomes will each daughter cell have after the completion of the above division?**



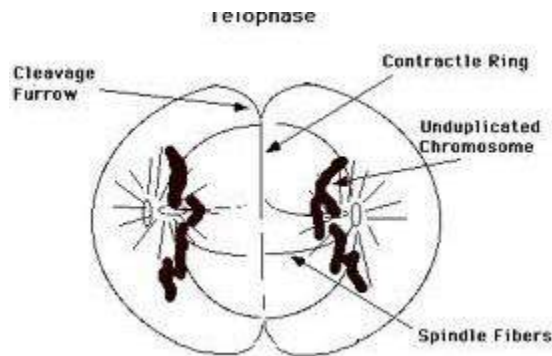
**(v) Name the four nitrogenous bases.**

**Ans- (b)**

(i) Two sister chromatids of each chromosome separate from each other and move to opposite poles so this is Anaphase.

(ii) This is an Animal cell because centrioles are seen at the opposite poles.

(iii) Telophase is followed by Anaphase.



**Telophase**

iv) Each daughter cell will have one set of chromosome present in parent cell.

(v) Adenine, Guanine, cytosine, thymine are four nitrogenous bases.

## **Question 7**

**a) Answer the following questions briefly**

**(i) How are cytons and axons placed in the brain and spinal cord?**

Ans: The grey matter containing Cytons is placed in the outer portion and the white matter containing axons is placed in the inner portion in the brain. In the spinal cord grey matter is placed on the inner portion and the white matter is placed on the outer portion.

**ii) Which part of the Human ear gives 'Dynamic balance' and 'static balance' to the body?**

Ans: The sensory cells in semicircular canal of inner ear give dynamic equilibrium and the utricle and saccule cells of inner ear give static balance.

**(iii) Explain how the human eye adapts itself to bright light and dim light.**

Ans: The movements of muscle fibres of iris control the size of pupil and regulate the amount of light entering the eye.

**(iv) What is parthenocarpy? Give one example.**

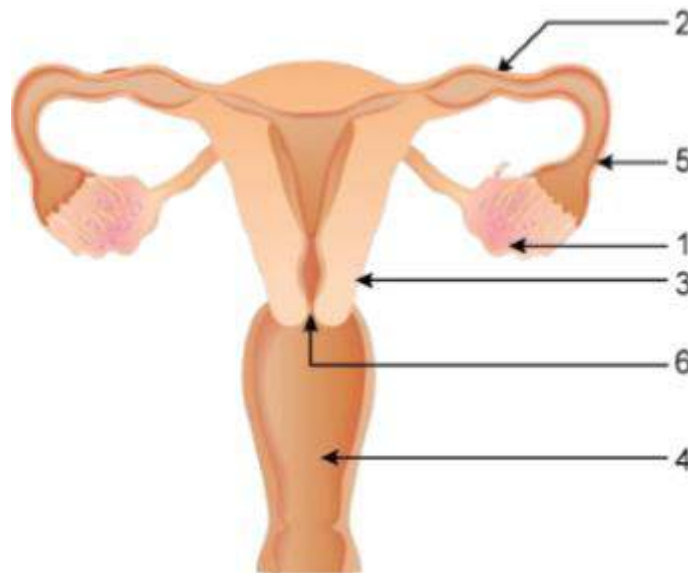
Ans: The process of development of fruit without fertilization is called parthenocarpy. In fruits like apple, banana auxin induces fruit formation.

**v) Mention any two objectives of 'Swachh Bharat Abhiyaan'.**

Ans: Objectives of 'Swachh Bharat Abhiyaan' are -

- The first objective of the mission is to construct individual and community toilets.
- The other objective is to reduce or eliminate open defecation from the country. Open defecation results in the deaths of thousands of children every year due to unhygienic living conditions and diseases.

**(b) The diagram given below represents a system in the human body. Study the diagram and answer the following questions. [5]**



(i) Identify the system.

(ii) Label the parts marked 5 and 6

(iii) Name the two hormones secreted by 1.

(iv) Mention the number and the name of the part involved in fertilization and implantation from the above diagram.

v) Mention the surgical methods of contraception in 1

Ans-

(i) Female Reproductive System is shown in the given Diagram.

(ii) Part 5 is Fallopian tube. Part 6 is External os.

(iii) Two hormone secreted by 1 are oestrogen and Progesterone.

(iv) the number and the name of the part involved in fertilization and implantation from the above diagram

Process	Number	Name
Fertilization	2	Fallopian Tube
Implantation	3	Uterus

(v) Surgical methods of contraception in male is called Vasectomy and for female it is called tubectomy.

\*\*\*\*\*

# ICSE Class 10 Biology Question Paper 2020

## BIOLOGY

### SCIENCE Paper – 3

*(Two hours)*

*Answers to this Paper must be written on the paper provided separately.*

*You will **not** be allowed to write during the first 15 minutes.*

*This time is to be spent in reading the Question Paper.*

*The time given at the head of this Paper is the time allowed for writing the answers.*

---

*Attempt **all** questions from **Section I** and **any four** questions from **Section II**.*

*The intended marks for questions or parts of questions are given in brackets [ ].*

---

### SECTION I (40 Marks)

*Attempt **all** questions from this Section*

#### Question 1

- (a) Name the following: [5]
- (i) The process of transformation of several glucose molecules into one molecule of starch.
  - (ii) The point of attachment of two chromatids.
  - (iii) The iron containing pigment in erythrocytes.
  - (iv) The duct which transports urine from the kidney to the urinary bladder.
  - (v) The part of the brain which is concerned with memory.

---

**This paper consists of 11 printed pages and 1 blank page.**



(b) Explain the following terms: [5]

- (i) Allele
- (ii) Diffusion
- (iii) Photolysis
- (iv) Phenotype
- (v) Population density

(c) Given below are certain groups of terms. In each group the first pair indicates a relationship between the two terms. Rewrite and complete the second pair on a similar basis. [5]

Example: Cytoplasm : Cytokinesis :: Nucleus : Karyokinesis.

- (i) Widening of hips: Oestrogen :: Deepening of voice in males : \_\_\_\_\_.
- (ii) Brain : Meninges :: Heart : \_\_\_\_\_.
- (iii) Insulin : Beta-cells :: Glucagon : \_\_\_\_\_.
- (iv) Kidney: Renal artery :: Liver : \_\_\_\_\_.
- (v) Uterus : Implantation :: Fallopian tube : \_\_\_\_\_.

(d) Given below are sets of five terms each. Rewrite the terms in correct order in a logical sequence beginning with the first word that is underlined: [5]

- (i) Stimulus, Response, Receptor, Effector, Spinal cord.
- (ii) Root hair, Endodermis, Epidermis, Xylem, Cortex.
- (iii) Conjunctiva, Yellow spot, Pupil, Vitreous Humour, Aqueous Humour.
- (iv) Australopithecus, Cro-Magnon Man, Homo erectus, Neanderthal Man, Homo sapiens.
- (v) Artery, Capillaries, Venule, Vein, Arteriole.

(e) Choose the correct answer from the four options given below: [5]

- (i) The fusion of the sperm and ovum is termed as:
  - A. Reproduction
  - B. Development
  - C. Fertilization
  - D. Embryo
- (ii) Agranulocytes are:
  - A. Lymphocytes, Monocytes
  - B. Lymphocytes, Basophils
  - C. Eosinophils, Basophils
  - D. Eosinophils, Monocytes
- (iii) Which of the following is not a natural reflex action?
  - A. Knee-jerk
  - B. Blinking of eyes due to strong light
  - C. Salivation at the sight of food
  - D. Sneezing when any irritant enters the nose
- (iv) The structural and functional units of excretion in the human kidney is the:
  - A. Ureter
  - B. Bowman's capsule
  - C. Renal pelvis
  - D. Nephron
- (v) In a human female, ovum consists of:
  - A. 23 pairs of autosomes
  - B. 22 pairs of autosomes and 1 pair of sex chromosomes
  - C. 22 autosomes and 1 Y-chromosome
  - D. 22 autosomes and 1 X-chromosome

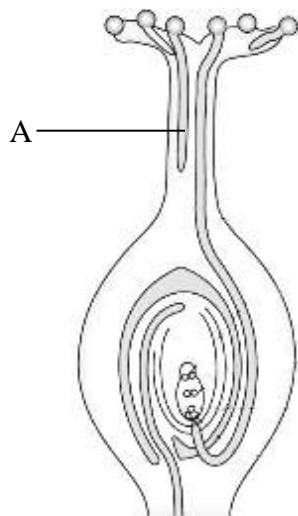
(f) Identify the **ODD** term in each set and name the **CATEGORY** to which the remaining three belong: [5]

- (i) Auxin, Ethylene, Adrenaline, Cytokinin
- (ii) Tympanum, Ear ossicles, Auditory canal, Pinna
- (iii) Syringes, Soiled dressings, Discarded needles, Household detergents
- (iv) Exophthalmic Goiter, Simple Goitre, Cretinism, Myxoedema
- (v) Adenine, Guanine, Creatinine, Cytosine

(g) Match the items given in column A with the most appropriate ones in Column B [5] and **REWRITE** the correct matching pairs:

Column A		Column B
(i) Biston betularia	-	Calcium
(ii) Testes	-	balance of the body
(iii) Clotting of blood	-	Light independent reaction
(iv) Stroma	-	diffusion of gases
(v) Stomata	-	gonad
	-	Peppered moth
	-	Light dependent reaction
	-	Chlorophyll

(h) The diagram given below represents a plant movement. [5]  
Answer the following questions:



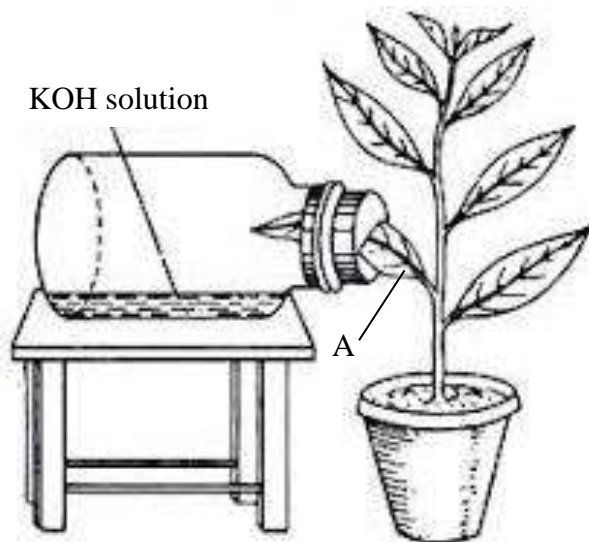
- (i) Name the tropic movement shown in the diagram.
- (ii) Explain the tropic movement mentioned in (i).
- (iii) Label the part marked 'A'.
- (iv) What is part A attracted to?
- (v) Give an example of a plant which shows Thigmotropism.

## SECTION II (40 Marks)

*Attempt any **four** questions from this Section.*

### Question 2

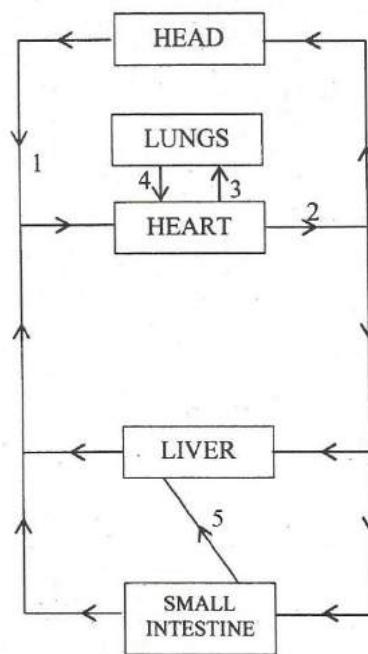
- (a) The diagram given below represents an experiment to prove the importance of a factor in photosynthesis. Answer the questions that follow: [5]



- (i) Which factor is being studied here?
- (ii) What is the purpose of keeping KOH in the flask?
- (iii) Explain the term Photosynthesis.
- (iv) What will you observe when the leaf A is tested for starch?
- (v) Write a well balanced chemical equation for the process of photosynthesis.



- (b) The diagram given below represents the simplified pathway of the circulation of blood. Answer the questions that follow: [5]

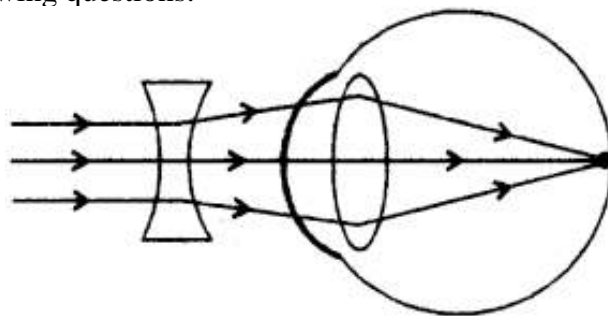


- Name the blood vessels labelled 1 to 4.
- Which blood vessel supplies oxygenated blood to the muscles of the heart?
- What is the importance of blood vessel labelled 5?
- What is the type of blood circulation that takes place between the heart and the lungs?
- Draw a diagram of the different blood cells as seen in a smear of human blood.

### Question 3

- (a) The diagram given below depicts a defect of the human eye which has been corrected by using a suitable lens. [5]

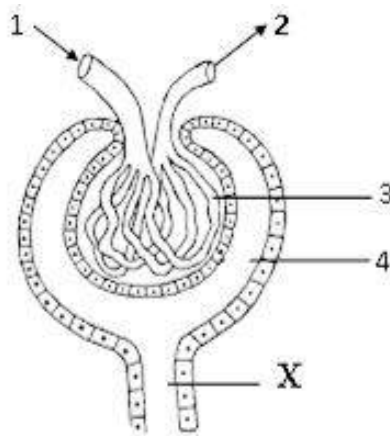
Answer the following questions:



- (i) Name the defect that has been corrected.  
Which type of lens has been used for the correction?
- (ii) Mention one cause for the above defect.
- (iii) Where would the image have formed if the above lens was not used for correction?
- (iv) Name the three concentric layers of the eyeball.
- (v) Draw a neat, labelled diagram of a neuron.
- (b) Give the biological reasons for the following statements: [5]
- (i) It is advisable to keep green plants in an aquarium.
- (ii) Water pollution is a major cause of concern in our country.
- (iii) We cannot distinguish colours in dim light.
- (iv) Medical discoveries such as antibiotics and vaccinations have indirectly contributed to the sharp rise in human population.
- (v) Homo sapiens sapiens is the most highly evolved form of man.

#### Question 4

- (a) The figure given below shows a part of a nephron. [5]  
Answer the questions that follow:

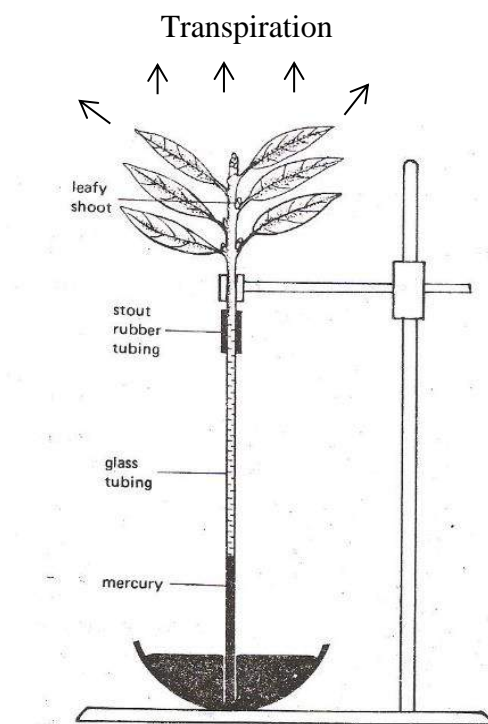


- (i) In which region of the kidney is the above structure present?

- (ii) Label the parts numbered 1 to 4.
- (iii) What is the technical term for the process that occurs in part 3?
- (iv) Why is fluid X not called urine? Justify your answer.
- (v) Draw a neat, labelled diagram of the urinary system of man.
- (b) Differentiate between the following pairs on the basis of what is mentioned in the brackets: [5]
- (i) Transpiration and Guttation (place of occurrence)
  - (ii) Biodegradable waste and Non-biodegradable waste (One example)
  - (iii) Population control and Swachh Bharat Abhiyan (One objective)
  - (iv) Osmosis and Active Transport (Substances undergoing movement)
  - (v) Metaphase and Anaphase (Position of chromosomes)

### Question 5

- (a) The diagram below represents an experiment to demonstrate a certain phenomenon in a green plant: [5]
- phenomenon in a green plant:



(i) Will the level of mercury in the glass tubing rise or fall?

Which conducting tissue of the plant does the glass-tubing represent?

(ii) Define Transpiration.

(iii) How will the rate of the above process differ if the environment of the plant has:

1. Less humidity
2. High temperature?

(iv) State any two advantages of transpiration to the plant.

(v) Draw a neat labelled diagram of a Plasmolysed cell.

(b) Give appropriate biological/ technical terms for the following: [5]

(i) The sensory organ in Cochlea.

(ii) Number of live births per 1000 people per year.

(iii) The point of contact between two neurons.

(iv) The accessory gland in human males whose secretion neutralises the acid in the vagina.

(v) Condition when blood sugar level is lowered in the blood.

(vi) Structure which helps in the adjustment of the size of the pupil.

(vii) A surgical method of fertility control in human males.

(viii) Process by which leucocytes migrate through the walls of capillaries.

(ix) A sudden inheritable change in one or more genes.

(x) A non-dividing phase of the cell cycle where more DNA is synthesised.



### Question 6

(a) State two functions of: [5]

- (i) Ear
- (ii) Ethylene
- (iii) Tears
- (iv) Testis
- (v) Cerebellum

(b) Complete the table: [5]

Name of the Hormone	Endocrine Gland	Function
(i)	(ii)	Deposits extra glucose of blood as glycogen
Growth Hormone	(iii)	(iv)
(v)	Thyroid	(vi)
(vii)	(viii)	Prepare body for any emergency
Oxytocin	(ix)	(x)

### Question 7

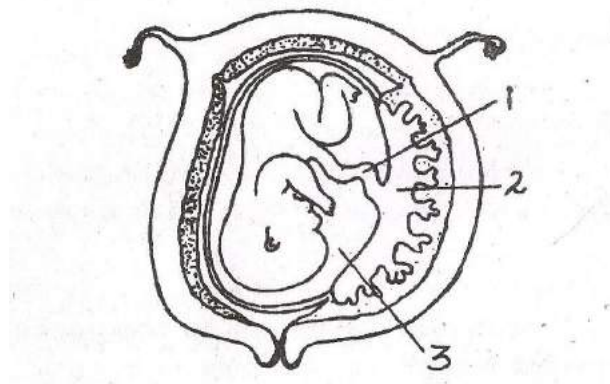
(a) A homozygous dominant tall pea plant bearing red flowers (TTRR) is crossed with a homozygous recessive dwarf pea plant bearing white flowers (ttrr). [5]

- (i) What is the phenotype and genotype of F<sub>1</sub> individuals?
- (ii) Write the possible combination of gametes that are obtained when two F<sub>1</sub> hybrid plants are crossed.
- (iii) Mention the phenotypic ratio of the F<sub>2</sub> generation.
- (iv) State Mendel's Law of Independent Assortment.
- (v) Name two X-linked disorders found in humans.

(b) The diagram given below is that of a developing human foetus.

[5]

Answer the questions that follow:



- (i) Label the parts numbered 1 to 3 in the diagram.
- (ii) Mention any two functions of the part labelled 2 in the diagram.
- (iii) Explain the significance of the part numbered 3 in the diagram.
- (iv) Define the term 'Gestation'.

What is the normal gestational period of the developing embryo?

- (v) Mention the sex chromosomes in a male and female embryo.

**ICSE Board  
Class X Biology  
Board Paper  
Semester 1 - 2021**

**Time: 1 hr**

**Total Marks: 40**

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*Maximum Marks: 40*

*Time Allowed: One Hour*

*You will not be allowed to write during the first 10 minutes.*

*This time is to be spent in reading the question paper.*

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**ALL QUESTIONS ARE COMPULSORY**

*The marks intended for the questions are given in brackets [ ]*

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**Select the correct option for each of the following questions.**

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**Question 1**

**Name the following by choosing the correct option:**

- (i) The process of conversion of ADP to ATP during photosynthesis:
  - (a) Polymerisation
  - (b) Photophosphorylation
  - (c) Photorespiration
  - (d) Photolysis
  
- (ii) Permanently open structures seen on the barks of old woody stems:
  - (a) Stomata
  - (b) Hydathodes
  - (c) Lenticels
  - (d) Epidermal pores
  
- (iii) The pressure developed in the roots due to continuous inward movement of water by cell to cell osmosis:
  - (a) Root Pressure
  - (b) Wall Pressure
  - (c) Turgor Pressure
  - (d) Air Pressure
  
- (iv) The type of gene, which in presence of a contrasting allele is not expressed:
  - (a) Homozygous
  - (b) Heterozygous
  - (c) Dominant
  - (d) Recessive

- (v) After mitosis, a female human cell will have:
- (a) 44+XX chromosomes
  - (b) 22+X chromosomes
  - (c) 22+Y chromosomes
  - (d) 44+XY chromosomes

## Question 2

**Complete the following statements by choosing the appropriate option for each blank:**

- (i) At the end of \_\_\_\_\_, cytokinesis is completed.
- (a) Metaphase
  - (b) Prophase
  - (c) Interphase
  - (d) Telophase
- (ii) The genotype of a person who cannot roll his tongue is \_\_\_\_\_.
- (a) Rr
  - (b) RR
  - (c) rr
  - (d) RRr
- (iii) When a cell is placed in a \_\_\_\_\_ solution it becomes plasmolysed.
- (a) Distilled water
  - (b) Hypertonic
  - (c) Isotonic
  - (d) Hypotonic
- (iv) The nitrogenous base Adenine always pairs with \_\_\_\_\_
- (a) Thymine
  - (b) Guanine
  - (c) Cytosine
  - (d) Thiamine
- (v) The basic units of heredity are \_\_\_\_\_
- (a) Chromosomes
  - (b) Chromatids
  - (c) Genes
  - (d) Centrosome



### Question 3

**Choose the correct answer from each of the four options given below:**

- (i) NADP is expanded as:
  - (a) Nicotinamide Adenosine Dinucleotide Phosphate
  - (b) Nicotinamide Adenine Dinucleotide Phosphate
  - (c) Nicotinamide Adenine Dinucleolus Phosphate
  - (d) Nicotinamide Adenosine Dinucleolus Phosphate
  
- (ii) Transpiration is useful to the plant because it:
  - (a) Creates a suction force for absorption of water from the soil
  - (b) Helps in photophosphorylation
  - (c) Synthesises glucose
  - (d) Splits water molecules
  
- (iii) A homozygous pea plant having purple flowers is crossed with a homozygous pea plant bearing white flowers. The phenotypic ratio of the offspring obtained in  $F_2$  generation is:
  - (a) 2:1
  - (b) 1:1
  - (c) 1:2:1
  - (d) 3:1
  
- (iv) The shoot from a balsam plant is kept in a beaker containing eosin solution (pink). The pink colour will be distinctly seen in the:
  - (a) Xylem
  - (b) Phloem
  - (c) Epidermis
  - (d) Cortex
  
- (v) Replication of DNA in the cell cycle occurs during the:
  - (a)  $G_1$  – Phase
  - (b) Anaphase
  - (c) S – Phase
  - (d)  $G_2$  – Phase

### Question 4

**Explain the following terms:**

- (i) Karyokinesis
  - (a) It is the division of nucleus during cell division
  - (b) It is the division of cytoplasm during cell division
  - (c) It is the division of centrosome
  - (d) It is the division of nucleolus

(ii) Law of Dominance

- (a) Out of a pair of contrasting alleles present together, only the recessive allele is able to express itself while the dominant remains suppressed
- (b) Out of a pair of contrasting alleles present together, only the dominant allele is able to express itself while the recessive remains suppressed
- (c) Out of a pair of contrasting alleles present together, both dominant and recessive cannot express themselves
- (d) Out of a pair of contrasting alleles present together, both dominant and recessive can express themselves

(iii) Mutation:

- (a) It is a sudden change in one or more genes in an organism's cells which is heritable
- (b) It is a change in the number of centrosomes in an organism's cell which is heritable
- (c) It is a change in the structure of cell membrane in an organism's cells which is heritable
- (d) It is a change in the shape of cells which is heritable

(iv) Photosynthesis

- (a) It is the synthesis of glucose from carbon dioxide by non-green plants using light energy.
- (b) It is the synthesis of glucose by green plants from carbon dioxide using light energy.
- (c) It is the synthesis of glucose from carbon dioxide and water by non-green plants using light energy.
- (d) It is the synthesis of glucose from carbon dioxide and water by green plants using light energy.

(v) Transpiration:

- (a) It is the loss of water in the form of droplets from the aerial parts of the plant.
- (b) It is the loss of water in the form of water vapour from the underground parts of the plant.
- (c) It is the loss of water in the form of water vapour from the aerial parts of the plant.
- (d) It is the loss of water in the form of water vapour from all parts of the plant.

**Question 5**

Mention the exact location of the following:

(i) Aster

- (a) Around the centrioles in plant cells
- (b) Around the centrioles in animal cells
- (c) Around the chromatids in animal cells
- (d) Around the chromatids in plant cells

- (ii) Guard cells
  - (a) Around the root hairs
  - (b) Around the lenticels
  - (c) Around the thylakoids
  - (d) Around the stoma
- (iii) Xylem tissue:
  - (a) Conducts water and minerals in leaves
  - (b) Does not conduct water and minerals in stems
  - (c) Conducts food and nutrition to roots
  - (d) Conducts food and nutrients to all parts of the plant
- (iv) Centrioles
  - (a) Found only in plant cells
  - (b) Found inside nucleus
  - (c) Found only in animal cells
  - (d) Found in animal and plant cells
- (v) Genes
  - (a) Present on cell walls
  - (b) Present on chloroplast
  - (c) Present on chromosomes
  - (d) Present on centrosomes

### **Question 6**

**State the function of the following:**

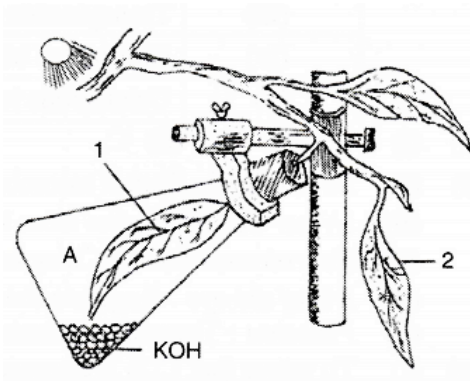
- (i) Cell wall
  - (a) Regulates entry of solutes in plant cells
  - (b) Regulates entry of solutes in animal cells
  - (c) Gives rigidity and shape to plant cells
  - (d) Gives rigidity and shape to animal cells
- (ii) Centromere:
  - (a) It is the point of attachment of two sister chromatids
  - (b) It is the point of attachment of two centrioles
  - (c) It is the point of attachment of two centrosomes
  - (d) It is the point of attachment between two daughter nuclei
- (iii) Cuticle on leaves:
  - (a) Prevents photosynthesis
  - (b) Reduces transpiration
  - (c) Protects leaves from grazing animals
  - (d) Gives colour to leaves

- (iv) Hydathodes
  - (a) Transpiration
  - (b) Absorption of water
  - (c) Photosynthesis
  - (d) Guttation
- (v) Grana of chloroplast is not the:
  - (a) Site of Light Independent Phase
  - (b) Site of Light Dependent Phase
  - (c) Site of Photolysis
  - (d) Site of Photon Absorption

### Question 7

The diagram given below presents an experiment to demonstrate a particular aspect of Photosynthesis. The letter 'A' indicates a certain condition inside the flask:

Answer the Questions:

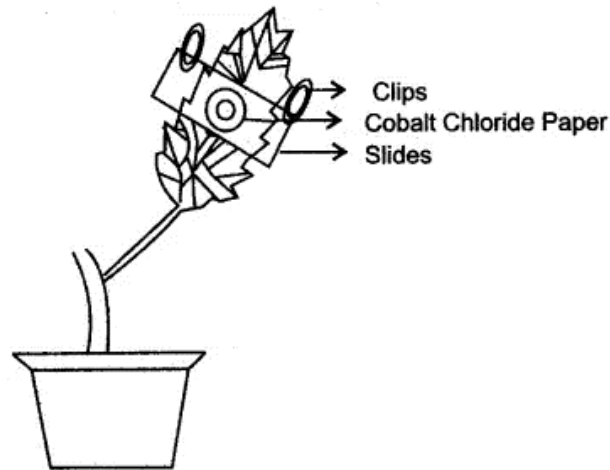


- (i) What is the aim of the experiment?
  - (a) To show that oxygen is released during photosynthesis
  - (b) To show that photosynthesis occurs in the presence of KOH
  - (c) To show that chlorophyll is necessary for photosynthesis
  - (d) To show that carbon dioxide is necessary for photosynthesis
- (ii) What is the special condition inside the flask?
  - (a) Air inside the flask is free of oxygen
  - (b) Air inside the flask is free of carbon dioxide
  - (c) Air inside the flask is free of nitrogen
  - (d) KOH purifies the air inside the flask
- (iii) An alternative chemical that can be used instead of KOH is:
  - (a) Sodium Hydroxide
  - (b) Sodium Chloride
  - (c) Potassium Chloride
  - (d) Potassium Permanganate

- (iv) In what manner, do the leaves 1 and 2 differ at the end of the starch test?
- (a) Leaf 1 turns brown, Leaf 2 turns blue black
  - (b) Leaf 1 turns blue black, Leaf 2 turns blue brown
  - (c) Leaf 1 turns purple, Leaf 2 remains green
  - (d) There is no change in the colour of the leaves
- (v) What is the important step that should be taken before performing this experiment?
- (a) The plant should be placed in dark for 24 hours to destarch the entire plant.
  - (b) The plant should be placed in dark for 24 hours to remove chlorophyll from the leaves
  - (c) The plant should be placed in dark for 24 hours to destarch the leaves
  - (d) The plant should be placed in dark for 24 hours for the roots to absorb water

### Question 8

Given below is the diagram of an experiment step-up to study the process of Transpiration. Cobalt chloride papers are fixed on the upper as well as lower surface of the leaf. Answer the question that follow:



- (i) What is the aim of the experiment?
- (a) To prove that more transpiration occurs from the lower surface of a dicot leaf
  - (b) To prove that more transpiration occurs from the upper surface of a dicot leaf
  - (c) To prove that transpiration is equal on both sides of the leaf
  - (d) To prove that transpiration does not take place in a dicot leaf
- (ii) What is the colour of dry Cobalt Chloride paper?
- (a) Pink
  - (b) Blue
  - (c) Brown
  - (d) White



- (iii) After about an hour, what change, if any, would you expect to find in the cobalt chloride paper placed on the upper and lower surface of the leaf?
- (a) Upper Surface – Pink, Lower Surface – Blue
  - (b) Upper Surface – White, Lower Surface – Blue
  - (c) Upper Surface – less Pink, Lower Surface – more Pink
  - (d) Upper Surface – more Pink, Lower Surface – less Pink
- (iv) Two adaptation in plants to reduce transpiration are: \_\_\_\_\_
- (a) Narrow Leaves, Thin cuticles
  - (b) Fewer Stomata, Broad lamina of leaves
  - (c) Thin cuticles, Sunken stomata
  - (d) Narrow leaves, Fewer stomata
- (v) The rate of transpiration is less when there is:
- (a) High humidity in the air and low temperature
  - (b) Less humidity in the air and decrease in atmospheric pressure
  - (c) Bright sunlight and high temperature
  - (d) More wind and low intensity of sunlight

# Solution

**Time: 1 hr**

**Total Marks: 40**

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## **Answer 1**

- (i) Photophosphorylation
- (ii) Lenticels
- (iii) Root pressure
- (iv) Recessive
- (v) 44 + XX chromosomes

## **Answer 2**

- (i) Telophase
- (ii) rr
- (iii) Hypertonic
- (iv) Thymine
- (v) Genes

## **Answer 3**

- (i) Nicotinamide Adenine Dinucleotide Phosphate
- (ii) Creates a suction force for absorption of water from the soil
- (iii) 3 : 1
- (iv) Xylem
- (v) S - Phase

## **Answer 4**

- (i) It is the division of nucleus during cell division.
- (ii) Out of a pair of contrasting alleles present together, only the dominant allele is able to express itself while the recessive remains suppressed.
- (iii) It is a sudden change in one or more genes in an organism's cells which is heritable.
- (iv) It is the synthesis of glucose from carbon dioxide and water by green plants using light energy.
- (v) It is the loss of water in the form of water vapour from the aerial parts of the plant.

## **Answer 5**

- (i) Around the centrioles in animal cells
- (ii) Around the stoma
- (iii) Conducts water and minerals in leaves
- (iv) Found only in animal cells
- (v) Present on chromosomes

**Answer 6**

- (i) Gives rigidity and shape to plant cells.
- (ii) It is the point of attachment of two sister chromatids.
- (iii) Reduces transpiration.
- (iv) Guttation.
- (v) Site of light independent phase.

**Answer 7**

- (i) To show that carbon dioxide is necessary for photosynthesis.
- (ii) Air inside the flask is free of carbon dioxide.
- (iii) Sodium hydroxide.
- (iv) Leaf 1 turns brown, Leaf 2 turns blue black.
- (v) The plant should be placed in dark for 24 hours to destarch the leaves.

**Answer 8**

- (i) To prove that more transpiration occurs from the lower surface of a dicot leaf.
- (ii) Blue
- (iii) Upper surface - less pink, lower surface – more pink
- (iv) Narrow leaves, Fewer stomata
- (v) High humidity in the air and low temperature.

# ICSE Biology Grade X

## Solution for 2022-23 Examination

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### BIOLOGY

(SCIENCE PAPER - 3)

**Maximum Marks: 80**

**Time allowed: Two hours**

**Answers to this Paper must be written on the paper provided separately.**

**You will not be allowed to write during the first 15 minutes.**

**This time is to be spent in reading the question paper.**

**The time given at the head of this Paper is the time allowed for writing the answers.**

**Section - A (40 Marks)**

**(Attempt all questions from this section)**

Question 1. Select the correct answers to the questions from the given options.  
(Do not copy the questions, write the correct answer only).

(i) The sex chromosome in a human ovum is:

- (a) X chromosome
- (b) Y chromosome
- (c) Both X and Y chromosomes
- (d) Either X or Y chromosome

**Answer - (a) X chromosome**

Ovum contains one single X chromosome while sperm can have either X or Y chromosome.

(ii) Which one of the following is a biodegradable waste?

- (a) Metal cans
- (b) E-waste
- (c) Plastic
- (d) Flowers

**Answer - (d) Flowers**

Flowers are biodegradable as they can be degraded by the microbes present in the soil.

(iii) The heart sound 'Dup' is produced when

- (a) Semilunar valves open
- (b) Atrioventricular valves close
- (c) Semilunar valves close
- (d) Atrioventricular valves open

**Answer - (c) Semilunar valves close**

The first heart sound is produced by the closure of the AV valves while the second heart sound is produced by the closure of the semilunar valves.

(iv) Deplasmolysis occurs when a plasmolysed cell is placed in

- (a) Concentrated salt solution
- (b) Tap water
- (c) Crated agar solution
- (d) Hypertonic salt solution

**Answer - (b) Tap water**

When a deplasmolysed cell is placed in tap water which is a hypotonic solution the water will move inside the cell. This is also known as endosmosis.

(v) Alpha cells of Pancreas secrete

- (a) Glycogen
- (b) Glucose
- (c) Glucagon
- (d) Insulin

**Answer - (c) Glucagon**

Alpha cells secrete glucagon hormone which converts glycogen back to glucose.

(vi) Haploid number of chromosomes are found in

- (a) Nephrons
- (b) Neurons
- (c) Skin cells
- (d) Sperms



**Answer -(d) Sperms**

Sperms have half of the chromosome hence called haploid (22+X or 22+Y ).

(vii) The lifespan of an RBC is

- (a) 120 days
- (b) 220 days
- (c) 20 days
- (d) 2 weeks

**Answer - (a) 120 days**

The RBC gets destroyed after 120 days.

(viii) The statistical study of human population is called

- (a) Mortality
- (b) Demography
- (c) Natality
- (d) Equality

**Answer - (b) Demography**

The study of the human population is called demography.

(ix) The pale yellow colour of normal human urine is due to the pigment:

- (a) Melanin
- (b) Anthocyanin
- (c) Urochrome
- (d) Hemoglobin

**Answer - (c) Urochrome**

Urine has a yellow tint due to the presence of urochrome. It is formed through the breakdown of bile pigments in the liver, preceded by the breakdown of hemoglobin.

(x) Stimulation of the nerves of the sympathetic nervous system

- (a) Accelerates heartbeat
- (b) Constricts pupil of eyes
- (c) Increases peristalsis
- (d) Retards heartbeat

**Answer - (a) Accelerates heartbeat**

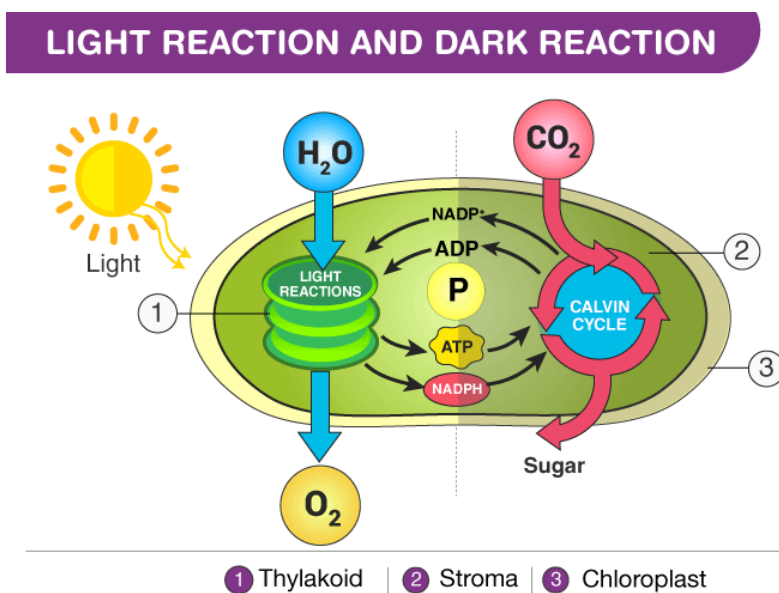
Sympathetic nervous system is a component of the autonomic nervous system which Accelerates heartbeat.

(xi) The site of light reaction in the cells of a green leaf is

- (a) Nucleus
- (b) Grana of chloroplast
- (c) Cytoplasm
- (d) Stroma of chloroplast

**Answer -** (b) Grana of chloroplast

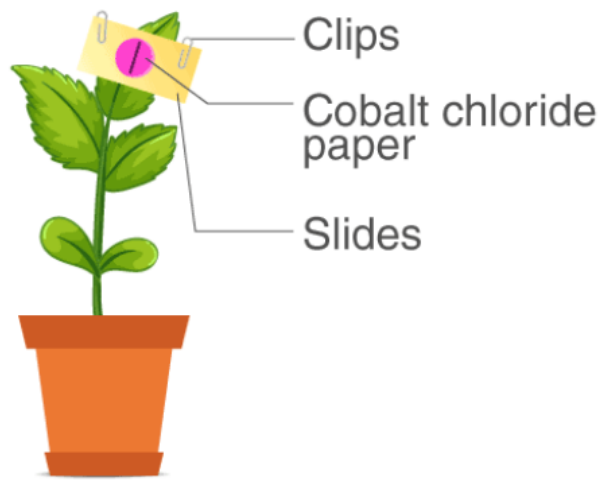
Stacks of lamellae in plastids is known as grana. These are the sites of conversion of light energy into chemical energy.



(xii) The paper used to demonstrate unequal transpiration in a dicot leaf is

- (a) Filter paper
- (b) Litmus paper
- (c) Starch paper
- (d) Cobalt chloride paper

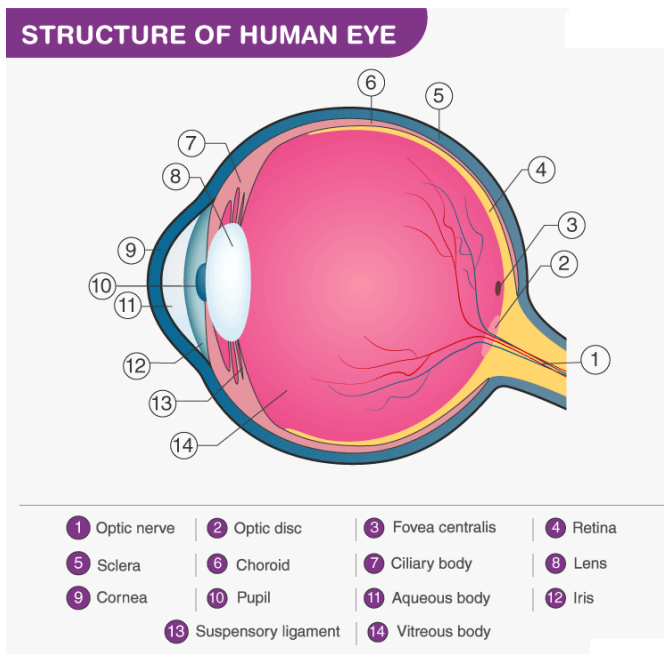
**Answer -** (d) Cobalt chloride paper



(xiii) Vitreous humour is present between:

- (a) Cornea and Iris
- (b) Lens and Retina
- (c) Iris and Lens
- (d) Cornea and Lens

**Answer - (b) Lens and Retina**



(xiv) Oxygenated blood to liver is supplied by

- (a) Hepatic artery
- (b) Hepatic vein
- (c) Inferior vena cava
- (d) Hepatic portal vein

**Answer - (a) Hepatic artery**

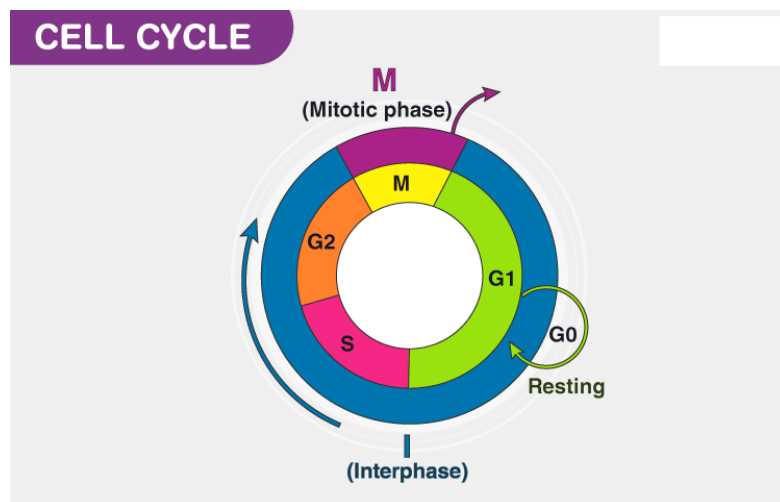
Hepatic artery is the major blood vessel that carries blood to the liver.

(xv) During the synthesis phase of the cell cycle, more of

- (a) RNA is synthesised
- (b) RNA and proteins are synthesised
- (c) DNA is synthesised
- (d) Glucose is synthesized

**Answer - (c) DNA is synthesised**

S phase (Synthesis) – DNA replication takes place during this phase. If the initial quantity of DNA in the cell is denoted as  $2N$ , then after replication it becomes  $4N$ . However the number of chromosomes does not vary, viz., if the number of chromosomes during G1 phase was  $2n$ , it will remain  $2n$  at the end of S phase. The centriole also divides into two centriole pairs in the cells which contain centriole.



## Question 2

(i) Name the following:

- (a) The organelle that forms the aster during cell division.
- (b) A genetic disorder in which the blood does not clot.
- (c) The permanent stoppage of menstruation in human females around the age of 45
- (d) The openings on the barks of trees through which transpiration occurs.

(e) A gaseous plant hormone which promotes ripening of fruits.

**Answer -**

- (a) Centrosome
- (b) Hemophilia
- (c) Menopause
- (d) Lenticels
- (e) Ethylene Hormone

(ii) Arrange and rewrite the terms in each group in correct order to be in a logical sequence *beginning* with the term that is underlined

- (a) Snake, Rabbit, Cabbage, Hawk
- (b) Xylem, Soil water, Cortical cells, Root hair
- (c) Receptor, Response, Effector, Spinal Cord
- (d) Fovea, Lens, Cornea, Conjunctiva
- (e) Testis, Urethra, Sperm duct, Epididymis

**Answer -**

- (a) Cabbage, Rabbit, Snake, Hawk
- (b) Soil water, Root hair, Cortical cells, Xylem
- (c) Receptor, Spinal cord, Effector, Response
- (d) Conjunctiva, Cornea, Lens, Fovea
- (e) Testis, Epididymis, Sperm duct, Urethra

(iii) Match the items given in Column I with most appropriate ones in Column II and rewrite the correct matching pairs:

**Column I**

- (a) Hyposecretion of Thyroxine in adults
- (b) Hyposecretion of Insulin
- (c) Hypersecretion of Growth hormone in childhood
- (d) Hyposecretion of ADH
- (e) Hypersecretion of Thyroxine

**Column II**

- 1. Diabetes insipidus
- 2. Myxedema
- 3. Dwarfism
- 4. Gigantism
- 5. Diabetes mellitus
- 6. Exophthalmic goitre
- 7. Cretinism

**Answer -**

**Column I**

- (a) Hyposecretion of Thyroxine in adults

**Column II**

- 1. Cretinism, Myxedema



- |   |                        |
|---|------------------------|
| (b) Hyposecretion of Insulin                      | 2. Diabetes mellitus   |
| (c) Hypersecretion of Growth hormone in childhood | 3. Gigantism           |
| (d) Hyposecretion of ADH                          | 4. Diabetes insipidus  |
| (e) Hypersecretion of Thyroxine                   | 5. Exophthalmic goitre |

(iv) Choose the **odd** one out from the following terms and name the **category to which the others belong**.

- (a) Used bandages, Pesticides, Face masks, Syringes
- (b) Dust, Smoke, Carbon monoxide, Effluents
- (c) Uterus, Urethra, Urinary bladder, Ureter
- (d) Menstrual phase, Telophase, Follicular phase, Luteal phase
- (e) Malleus, Incus, Cochlea, Stapes

**Answer -**

- (a) Pesticides - Pesticides are chemicals which are used for killing pests.
- (b) Effluents - liquid waste that is sent out from factories or places where sewage is dealt with, usually flowing into rivers, lakes, or the sea.
- (c) Uterus - It is a part of the female reproductive system where the embryo develops.
- (d) Telophase - It is one of the stages of cell division.
- (e) Cochlea - It is the innermost part of the ear.

(v) State the exact location of the following structures

- (a) Thyroid gland
- (b) Dura mater
- (c) Amniotic fluid
- (d) Papillary muscles
- (e) Islets of Langerhans

**Answer -**

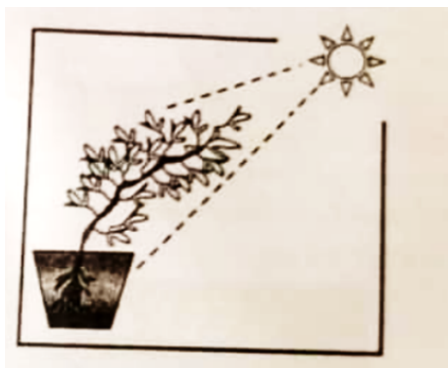
- (a) Thyroid gland - Thyroid Gland is situated in the anterior portion of the neck.
- (b) Dura mater - located directly under your skull and vertebral column.
- (c) Amniotic fluid - Amniotic fluid is located in the cavity between amnion and embryo in the uterus.
- (d) Papillary muscles - papillary muscles of the heart are pillar-like muscles seen within the cavity of the ventricles, attached to their walls.
- (e) Islets of Langerhans - These are endocrine cells found in the pancreas that secrete hormones.

## SECTION B (40 Marks)

(Attempt any four questions from this Section)

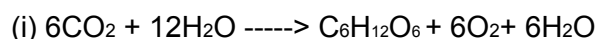
**Question 3**

- (i) Write the overall chemical equation for photosynthesis.
- (ii) Mention any two functions of blood.
- (iii) Differentiate between Karyokinesis and Cytokinesis
- (iv) Excessive use of fertilizers in agricultural fields reduces the yield of crops Justify the statement.
- (v) Study the diagram given below and answer the questions that follow



- (a) Name the phenomenon depicted by the shoot in the above diagram
- (b) Which plant hormone plays an important role in the above movement?
- (c) Complete and rewrite the given statement by filling in the correct terms: Shoots show positive \_\_\_\_\_ whereas, roots show positive \_\_\_\_\_.

**Answer -**



- For each molecule of glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) produced during photosynthesis, six molecules of carbon dioxide ( $\text{CO}_2$ ) and twelve molecules of water ( $\text{H}_2\text{O}$ ) are required.
- The molecules of water get oxidized and the electrons so released are then utilised for the reduction of carbon dioxide to form glucose.

(ii) Functions of blood:

1. Transportation of oxygen from the lungs to the tissues.
2. Transportation of digested food from the small intestine to the tissues and cells around the body.

(iii) Karyokinesis vs Cytokinesis

Karyokinesis	Cytokinesis
--------------	-------------

(a) Karyokinesis means the process of division of the nucleus.	(a) Cytokinesis means the process of division of cytoplasm.
(b) The nucleus gets divided into two daughter nuclei.	(b) The cytoplasm, cell organelles and the nuclei divide and are passed onto daughter cells equally.
(c) It can occur with or without cytokinesis.	(c) It is dependent on karyokinesis.

(iv) The excessive use of fertilizers in agricultural fields can actually have a negative impact on crop yields in the long run. This is because excessive fertilizer use can lead to a number of problems, including:

**Soil acidification:** Overuse of nitrogen-based fertilizers can cause the soil to become more acidic, which can ultimately reduce the soil's ability to support healthy plant growth.

**Nutrient imbalances:** Overuse of a particular type of fertilizer can lead to imbalances in soil nutrients, which can cause some nutrients to become unavailable to the plant, while others are present in excess. This can lead to stunted growth and reduced yields.

(v) (a) The phenomenon depicted by the shoot in the above diagram is phototropism.

(b) Auxin plays an important role in phototropism.

(c) Shoots show positive **phototropism** whereas, roots show positive **geotropism**.

#### Question 4

(i) Expand the abbreviation - DNA

(ii) What is Active transport?

(iii) Mention the two pairs of nitrogenous bases which pair with each other with hydrogen bonds.

(iv) State Mendel's 'Law of Segregation'

(v) Draw a neat, labelled diagram of a human sperm

#### Answer -

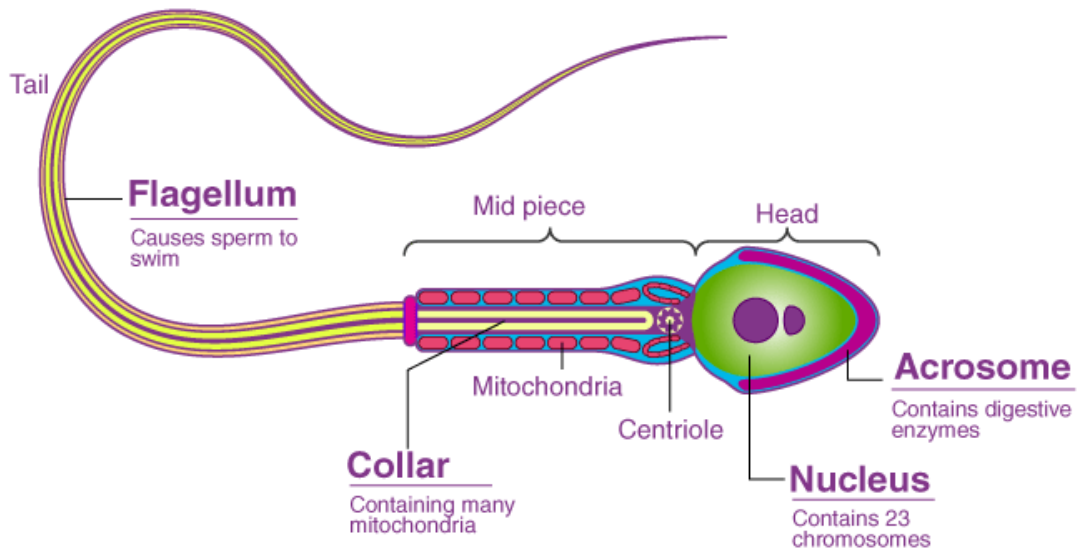
(i) Deoxyribonucleic acid.

(ii) Active Transport is defined as a process that involves the movement of molecules from a region of lower concentration to a region of higher concentration against a gradient or an obstacle with the use of external energy.

(iii) Adenine pairs with Thymine, and Cytosine pairs with Guanine.

(iv) Mendel's law of segregation states that: During the formation of gamete, each gene separates from each other so that each gamete carries only one allele for each gene

(v)



### Question 5

- Explain the term "Population density".
- Name the two surgical methods of population control.
- Mention two factors responsible for population explosion in India.
- Name any two resources which come under pressure due to rising population.
- The diagram given below depicts the climate change on planet Earth.

Answer the following questions:



- (a) Name the climatic phenomenon for the increase in Earth's temperature.  
(b) Mention one reason for this warming  
(c) What measures can be taken to prevent this climate change?

**Answer -**

- (i) Population density means the number of people living per unit area.  
It is normally written as per square km.  
(ii) Vasectomy and Tubectomy.  
(iii) (a) Illiteracy (b) Desire for Male children.  
(iv) (a) Food (b) Land  
(v) (a) Global warming  
(b) Due to the increase in concentration of greenhouse gases such
- Carbon dioxide.
  - Methane.
  - Ozone.
  - Nitrous oxide.
  - Water vapor

- (c) measures to prevent this climate change are  
(i) Stop deforestation and promote afforestation.  
(ii) Reduce air pollution caused due to vehicles and various industries.

**Question 6**

- (i) Define the term Transpiration.  
(ii) State any two adaptations in plants to reduce transpiration.  
(iii) Mention any two functions of the human foetal placenta.  
(iv) What is the significance of the human testes being located in scrotal sacs outside the abdomen?  
(v) Draw a neat, labelled diagram of a Malpighian Capsule.

**Answer -**

- (i) Transpiration is the process in which water is lost as water vapor from the aerial parts of the plants through stomata. Transpiration is essentially evaporation of water from the leaves of the plant.



(ii) (1) Spines instead of leaves: The leaves in the desert plants are modified into spines to decrease the surface area for transpiration.

(2) Thick cuticle on leaves: A waxy layer called cuticle on the surface of the leaves lowers the transpiration rate.

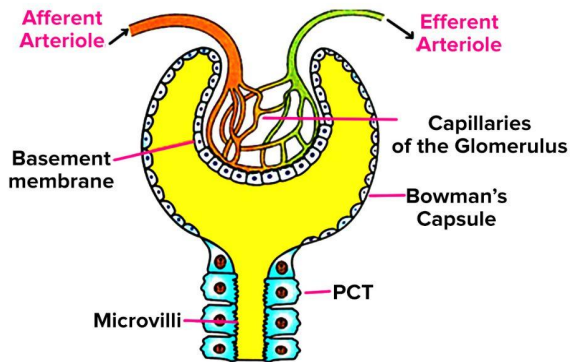
(3) Sunken stomata: The stomatal pores are not directly exposed to the leaves, reducing transpiration.

(iii) (1) The placenta provides nutrients and oxygen to the embryo while also eliminating carbon dioxide and waste materials produced by the embryo.

(2) The placenta produces hormones such as estrogens, human chorionic gonadotropin (hCG), and progesterone.

(iv) The presence of testes outside the abdominal cavity in the scrotum keeps the temperature of testes 2-3 degrees Celsius below the temperature of the body which is important for the production of sperm.

(v)



### Question 7

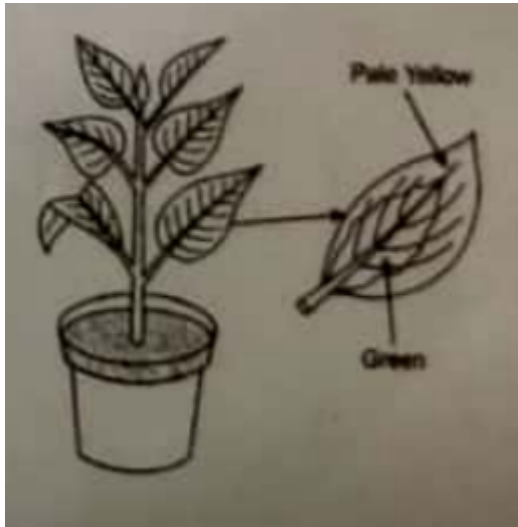
(i) What is a Reflex action?

(ii) Renal cortex has a dotted appearance and Renal medulla has a striped appearance. Explain.

(iii) What are the two functions of cerebellum?

(iv) Distinguish between Semicircular canals and Utriculus based on their function.

(v) A potted plant with variegated leaves was kept in dark for 24 hours and then placed in bright sunlight. Answer the following questions



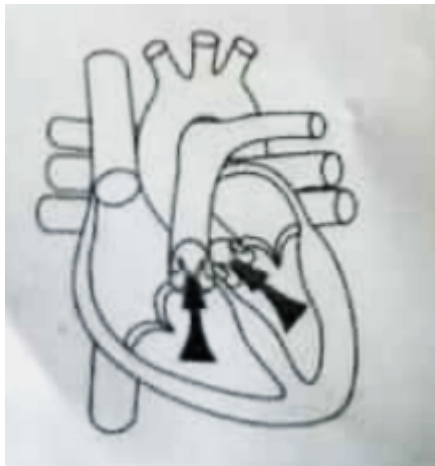
- (a) Which aspect of photosynthesis is being tested in the above diagram?
- (b) Why was the plant kept in the dark for 24 hours?
- (c) After the starch test what will be the colour of the yellow and green parts of the leaf? Give reasons to support your answer.

**Answer -**

- (i) Reflex is an involuntary and sudden response to stimuli. It happens to be an integral component of the famed survival instinct.
- (ii) The nephron has two parts- a cup shaped body called malpighian corpuscle or renal corpuscle and a tubular part called renal tubule. The cortex has a dotted appearance because of the presence of these malpighian corpuscles. The striated appearance of the medulla is due to the renal tubule.
- (iii) The cerebellum maintains the balance of the body.  
It also coordinates various muscular activities of the body.
- (iv) The semicircular canals, which respond to rotational movements (angular acceleration); and the utricle and saccule within the vestibule, which respond to changes in the position of the head with respect to gravity (linear acceleration).
- (v)
  - (a) Sunlight is the important aspect of photosynthesis which is tested here in this experiment.
  - (b) The plant was kept in dark to eliminate the starch in the leaves.
  - (c) After the starch test the green parts of the leaf will become blue black while the yellow parts lacking chlorophyll will show negative starch test.  
The green part which contains chlorophyll will be able to synthesize starch while the yellow part lacking chlorophyll will not be able to synthesize starch hence will show negative starch test.

### Question 8

- (i) Define the term Mutation.
  - (ii) A pure breeding red flower variety of pea plant (RR) is crossed with a pure breeding white flower variety of pea plant (rr). Draw a Punnett square to find out the Phenotypic and Genotypic ratios of the progeny belonging to the F<sub>2</sub> generation.
  - (iii) Leaves of certain plants roll up on a hot sunny day. Explain by giving suitable reasons.
  - (iv) What is a semi permeable membrane? Name the semi permeable membrane present in a plant cell.
  - (v) The diagram below depicts the human heart in one of its phases.
- Answer the questions that follow:



- (a) Which part of the heart is in the contraction phase?
- (b) Give a suitable reason to justify your answer in (a)
- (c) Distinguish between Systole and Diastole

Ans

- (i) Mutation is the change in our DNA base pair sequence due to various environmental factors such as UV light, or mistakes during DNA replication
- (ii)

### F<sub>1</sub> generation

	R	r
R	RR	Rr
r	Rr	rr

## F2 generation

	R	r
R	RR	Rr
r	Rr	rr

Phenotypic ratio is 3:1

Genotypic ratio is 1:2:1

(iii) Leaves of some plants roll up on a bright sunny day to reduce the effective surface area for transpiration. The reduced surface area ultimately reduces the rate of transpiration.

(iv) Semi-permeable membrane - A membrane through which only smaller molecules like water can pass but not the bigger molecules like solutes is known as semi-permeable membranes (SPM). Cell membrane or Plasma membrane is a living, thin, delicate, elastic, selectively permeable membrane made up of proteins and lipids, present in both plant and animal cell.

(v)

(a) Here in this diagram ventricles are the contracting part of the heart.

(b) The blood is moving into the respective arteries (Pulmonary artery and dorsal aorta ) because the ventricles are contracting.

(c)

Systole	Diastole
It happens when the heart muscle contracts and the blood moves to the aorta and pulmonary artery.	It happens when the heart muscle relaxes between two contractions and the heart is filled with blood.
Systole reduces the volume of the heart as all the blood gets pumped out.	Diastole increases the heart volume and makes it normal as the blood comes back in.

# Biology [Official]

CISCE

(English Medium)

Academic Year: 2023-2024

Date & Time: 18th March 2024, 11:00 am

Duration: 2h

Marks: 80

1. Answers to this Paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes.
3. This time is to be spent reading the question paper.
4. The time given at the head of this Paper is the time allowed for writing the answers.
5. Section A is compulsory. Attempt any four questions from Section B.
6. The intended marks for questions or parts of questions are given in brackets [ ].

## SECTION-A (40 Marks) (Attempt all questions from this Section.)

**Question 1.** Select the correct answers to the questions from the given options. (Do not copy the questions, write the correct answer only).

1.1. Duplicated chromosomes are joined at a point termed \_\_\_\_.

1. Centrosome
2. Centromere
3. Centriole
4. Chromatid

### Solution

Duplicated chromosomes are joined at a point termed centromere.

### Explanation:

Until they are split during cell division, the centromere is the point of attachment between the two sister chromatids of a chromosome.



1.2. The process of conversion of ADP to ATP during photosynthesis is called \_\_\_\_\_.

1. Photolysis
2. Phagocytosis
3. **Photophosphorylation**
4. Polymerisation

**Solution**

The process of conversion of ADP to ATP during photosynthesis is called **photophosphorylation**.

**Explanation:**

A phosphate group (a process known as phosphorylation) transforms adenosine diphosphate into adenosine triphosphate. Photophosphorylation (photo means light) is the process by which this is accomplished with light energy during photosynthesis.

1.3. The process in which water is lost from the margins of strawberry leaves is \_\_\_\_\_.

1. Osmosis
2. Imbibition
3. Diffusion
4. **Guttation**

**Solution**

The process in which water is lost from the margins of strawberry leaves is **guttation**.

**Explanation:**

Guttation is the process by which liquid water droplets from the leaves are removed. This morning process takes place on the leaves margins of the strawberry plant through pores known as hydathodes.

1.4. The hormone that affects urination is \_\_\_\_\_.

1. Adrenaline
2. **Vasopressin**
3. Oestrogen
4. Thyroxine

### Solution

The hormone that affects urination is vasopressin.

### Explanation:

Secreted by the posterior lobe of the pituitary gland, vasopressin, sometimes known as antidiuretic hormone (ADH), regulates the osmotic pressure of bodily fluids. It stimulates water reabsorption in the nephrons and returns it into the body's blood flow. Less quantity and concentrated urine are thus produced in the kidneys.

1.5. Which one of the following helps in the opening of stomata?

1. Cobalt ions
2. Potassium ions
3. Magnesium ions
4. Aluminium ions

### Solution

Potassium ions

### Explanation:

Potassium ions play a part in opening and closing the stomata holes. Guard cells become hypertonic and water enters them as the  $K^+$  ion concentration rises there. This swells them, and when the membrane stretches, the stomata pore opens. In the shutting of stomata, the reverse occurs.  $K^+$  ion concentration lowers; the cell becomes hypotonic and water leaves the cell, flaccid.

1.6. A zygote which has Y chromosome inherited from the father will develop into a \_\_\_\_\_.

1. Will depend on the chromosome inherited from the mother
2. Girl
3. Either boy or a girl
4. Boy

### Solution

A zygote which has Y chromosome inherited from the father will develop into a boy.

### Explanation:

The combination will have XY set in this regard because the mother always carries the X chromosome. That will be a boy, then.

1.7. The ear ossicle that transports sound vibrations to the inner ear:

1. Stapes
2. Mal
3. Incus
4. Cochlea

### Solution

Stapes

### Explanation:

The innermost bone of the middle ear, the stapes, links it to the inner ear. From the malleus and incus, the sound waves proceed to stape into the inner ear. The cochlea is not an ossicle or ear.

1.8. If a person has a heart attack, what must be done immediately?

- P. Loosen his/her clothing
  - Q. Make him/her lie down in an airy room
  - R. Rush him/her to the hospital
  - S. Engage him/her in a conversation
1. P and Q
  2. P and S
  3. R and S
  4. P, Q and R

### Solution

P, Q and R

### Explanation:

In the case of a heart attack, the patient must be made comfortable and ventilated properly. Any form of stress should be avoided. As a result, loosening tight clothes and causing him/her to lie down in an airy environment is correct. Also, we should rush the guy to the hospital. However, conversing with others can exhaust and stress a person.

1.9. Adjusting the focal length of the eye lens to view objects at different distances is done by \_\_\_\_\_.

1. Cornea
2. Iris
3. Ciliary muscles
4. Sclera

### Solution

Adjusting the focal length of the eye lens to view objects at different distances is done by ciliary muscles.

### Explanation:

Ciliary muscles both contract and relax to respectively make the eye lens thicker and flattening. This alters the eye lens's focus length and enables variable distance object viewing.

1.10. Four friends P, Q, R and S were discussing the examples of genetic disorders. The examples they quoted were as follows:

P. Colour blindness and Malaria

Q. Albinism and Cholera

R. Haemophilia and Colour blindness

S. Haemophilia and Albinism

Who gave the correct examples?

1. P and Q
2. R and S
3. P and R
4. Q and S

### Solution

R and S

### Explanation:

Malaria and cholera are examples of acquired diseases that result from bacterial infections. Genetic disorders include hemophilia (genetic anemia resulting from a lack of blood clotting capacity), color blindness (a genetic deficiency of distinguishing specific hues) and albinism (an inherited disorder of skin pigmentation or very light pale skin and hair).

1.11. Osmosis takes place when there is \_\_\_\_\_.

1. A freely permeable membrane
2. A cell wall
3. A selectively permeable membrane
4. An impermeable membrane

### Solution

Osmosis takes place when there is a selectively permeable membrane.

### Explanation:

On a semipermeable membrane, osmosis is the flow of solvent molecules along a concentration gradient. Solute molecules cannot pass over this membrane.

1.12. A male gorilla has 48 chromosomes in each of its body cells. How many chromosomes will each of the sperms have?



1. 24
2. 48
3. 17



4. 16

**Solution**

24

**Explanation:**

In gametes, chromosomes split in half. 48 chromosomes will thus be halved and just 24 will be found in a gorilla sperm cell.

1.13. Assertion (A): Sympathetic nervous system prepares the body for violent action against abnormal conditions.

Reason (R): Sympathetic nervous system accelerates heartbeat.

Which of the following is correct?

1. Both A and R are True.
2. A is True, R is False.
3. A is False but R is True.
4. Both A and R are False.

**Solution**

Both A and R are True.

**Explanation:**

Catecholamine hormones (epinephrine and nor-epinephrine) released by sympathetic nerve systems raise heart rate. Our body so gets ready for fight or flight and becomes hyperactive or violent under uncommon circumstances.

1.14. Birth rate is the number of live births per thousand persons in \_\_\_\_.

1. 1 year
2. 2 years
3. 10 years
4. 20 years

**Solution**

Birth rate is the number of live births per thousand persons in 1 year.

### Explanation:

Birth rate, sometimes referred to as natality, is the total number of live human births during a particular period divided by the period's length expressed in one year.

1.15. Industrial melanism was observed in \_\_\_\_\_.

1. Mice
2. Peppered Moth
3. House Flies
4. Crow

### Solution

Industrial melanism was observed in peppered moth.

### Explanation:

A perfect example of natural selection, industrial melanism shows how dark-coloured peppered moths evolved in response to air pollution in Great Britain during the Industrial Revolution.

### Question 2.

2.1.

2.1.a. Name the following:

Unicellular outgrowths from the epidermis of roots.

### Solution

Root hair

### Explanation:

From the root epidermis, these unicellular outgrowths help to draw minerals and water from the ground.

2.i.b Name the following:

A defect in our eyes in which some parts of the object are in focus while the other parts are blurred.

### **Solution**

Astigmatism

### **Explanation:**

It happens if the cornea or lens of the eye has uneven curves, resulting in vision blurriness due to the egg-shaped surface rather than the round shape.

2.i.c Name the following:

The tropic movement of plant parts in response to chemicals

### **Solution**

Chemotropism

### **Explanation:**

Chemotropism is the movement of plants brought on by chemical stimulation. Negative chemotropism results from a growth response away from the stimulus; positive chemotropism results from a growth response directed towards the stimulus. One such is the development of pollen tubes towards ovules.

2.i.d Name the following:

The main nitrogenous waste formed in the body.

### **Solution**

Urea

### **Explanation:**

It is the main waste product classified as nitrogenous. Together with other protein waste products, it is generated in the liver and removed by the kidneys as urine.

2.i.e Name the Following:

The process of attachment of fertilized ovum to the uterine wall.

### **Solution**

Implantation

### Explanation:

The sperm and egg unite in fertilisation to create a zygote in the fallopian tube; this zygote grows into a morula as it passes through it. Once in the uterus, the morula changes into a blastocyst. The blastocyst next settles within the uterine wall.

2.2.

2.2.a Arrange and rewrite the terms in group in correct order to be in a logical sequence, beginning with the term that is underlined:

Australopithecus, Cro-Magnon, Homo erectus, Neanderthal man.

### Solution

Australopithecus, Homo erectus, Neanderthal man, Cro-Magnon

### Explanation:

This is the series of stages in which modern man evolved.

2.2.b. Arrange and rewrite the term in group in correct order to be in a logical sequence, beginning with the term that is underlined:

Pupil, Aqueous humour, Retina, Vitreous humour.

### Solution

Aqueous humour, Pupil, Vitreous humour, Retina

### Explanation:

This is the order in which parts of eye develop from outside inside.

2.2.c. Arrange and rewrite the terms in group in the correct order to be in a logical sequence, beginning with the term that is underlined:

Effector, Receptor, Motor neuron, Sensory neuron.

### Solution

Receptor, Sensory neuron, Motor neuron, Effector.

### Explanation:

This is the series of steps involved in a reflex arc.

2.2.d. Arrange and rewrite the terms in group in correct order to be in a logical sequence, beginning with the term that is underlined:

Loop of Henle, Distal convoluted tubule, Bowman's Capsule, Proximal convoluted tubule.

**Solution**

Bowman's capsule, Proximal convoluted tubule, Loop of Henley, Distal convoluted tubule

**Explanation:**

As the filtrate passes through, this is the nephron's sequential arrangement of parts.

2.2.e. Arrange and rewrite the terms in group in correct order to be in a logical sequence, beginning with the term that is underlined:

Water vapour, Soil water, Leaves, Ascent of Sap.

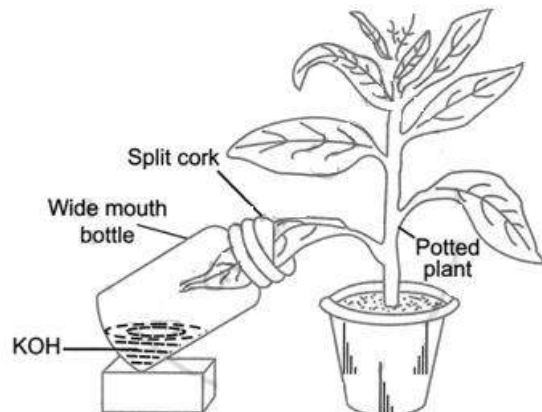
**Solution**

Soil water, Ascent of sap, Leaves, Water vapour.

**Explanation:**

This is the process by which water moves from the soil to the tip of the plant.

2.3. Study the diagram given below and fill in the blanks with suitable words:



In order to prove that carbon dioxide is necessary for

(a) \_\_\_\_\_, a potted plant is placed in dark for 48 hours to (b) \_\_\_\_\_ the leaves. A part of a leaf is inserted into a conical flask containing potassium hydroxide solution. This is to absorb (c) \_\_\_\_\_ from the flask. The plant is then placed in sunlight for a few hours. The experimental leaf is tested for starch. The part of the leaf that was inside the conical flask turns (d) \_\_\_\_\_, whereas the part of the leaf outside turns (e) \_\_\_\_\_ in colour.



### Solution

(a) Photosynthesis, a potted plant is placed in dark for 48 hours to (b) destarch the leaves. A part of a leaf is inserted into a conical flask containing potassium hydroxide solution. This is to absorb (c) carbon dioxide from the flask. The plant is then placed in sunlight for a few hours. The experimental leaf is tested for starch. The part of the leaf that was inside the conical flask turns (d) colourless, whereas the part of the leaf outside turns (e) blue-black in colour.

2.4.

2.4.a. Select the odd one from the following:

1. Prothrombin
2. Thrombin
3. Fibrinogen
4. **Albumin**

### Solution

Albumin

### Explanation:

Albumin (the others are blood coagulation factors). Albumin is a blood protein that isn't involved in blood coagulation.

2.4.b. Choose the odd one out from the following terms and name the category to which the others belong:

1. Tonsils
2. **Glomerulus**
3. Spleen
4. Lymph nodes

### Solution

Glomerulus

### Explanation:

Glomerulus (the rest are lymph nodes in the human body). The glomerulus is a section of the nephron.

2.4.c Choose the odd one out from the following terms and name the category to which the others belong:

1. Neutrophils
2. Basophils
3. Monocytes
4. Eosinophils

**Solution**

Monocytes

**Explanation:**

Granulocytes; all other types are monocytes. An agranulocyte is a monocyte.

2.4.d. Choose the odd one out from the following terms and name the category to which the others belong:

1. Leaves
2. Styrofoam
3. Grass
4. Cow Dung

**Solution**

Styrofoam

**Explanation:**

Styrofoam (all others are biodegradable).

2.4.e. Choose the odd one out from the following terms and name the category to which the others belong:

1. Pulmonary artery
2. Renal artery
3. Coronary artery
4. Hepatic artery

## Solution

### Pulmonary artery

#### Explanation:

Pulmonary artery (the others carry oxygenated blood; renal artery to the kidneys, coronary artery to the heart, hepatic artery to the liver). Deoxygenated blood is carried by the pulmonary artery to the lungs.

2.5. Match the items given in Column I with the most appropriate ones in Column II and rewrite the correct matching pairs:

	Column I		Column II
(a)	Leydig Cells	1.	Lack of thyroxine in children
(b)	Stoma	2.	12 pairs
(c)	Ova	3.	Testosterone
(d)	Cranial nerve	4.	Diffusion of respiratory gases
(e)	Cretinism	5.	Haploid cells
		6.	31 Pairs
		7.	Diploid cells

## Solution

	Column I		Column II
(a)	Leydig Cells	3.	Testosterone
(b)	Stoma	4.	Diffusion of respiratory gases
(c)	Ova	5.	Haploid cells
(d)	Cranial nerve	2.	12 pairs
(e)	Cretinism	1.	Lack of thyroxine in children

### Explanation:

- a. **Leydig cells:** The main function of these cells is to secrete androgens, such as testosterone (a male sex hormone).
- b. **Stoma:** The stoma facilitates gas transfer between the plant's leaves and the atmosphere.
- c. **Ova:** These are female gametes, which are haploid.
- d. **Cranial nerves:** Higher vertebrates have twelve pairs of cranial nerves.
- e. **Cretinism:** It is a disorder that causes aberrant mental and physical growth in children as a result of a shortage of thyroid gland hormones, or thyroxine.

### SECTION-B (40 Marks) (Attempt any four questions from this Section.)

#### Question 3.

3.1. Expand the abbreviation - NADP.

#### Solution

**NADP:** Nicotinamide Adenine Dinucleotide Phosphate

3.2. Mention two adaptations in roots for absorption of water from the soil.

#### Solution

The root hair cell's vacuole contains water. The root hair can absorb water from the soil in two ways:

- 1. The presence of several elongated root hairs increases the overall root surface area available for water absorption.
- 2. Their thin walls promote water intake via osmosis.

3.3. Differentiate between Afferent arteriole and Efferent arteriole.

#### Solution

Afferent arteriole	Efferent arteriole
--------------------	--------------------

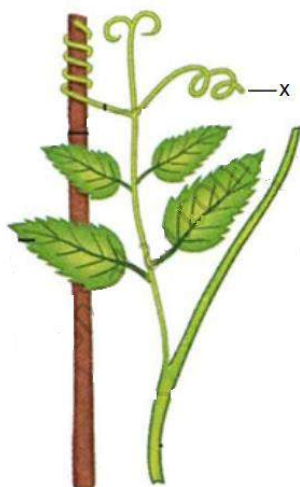
It brings oxygenated blood into the kidney.	It carries deoxygenated blood away from the kidney.
It carries blood to the glomerulus of the nephron.	It takes the blood away from the glomerulus.
It has a larger diameter.	It has a narrower diameter.
It is a branch of the renal artery and so it carries blood containing more water and nitrogenous wastes.	Efferent arterioles join to form renal veins and so they carry filtered blood back to circulation, containing much less water and nitrogenous waste.

3.4. Give two examples of water pollutants.

#### Solution

Chemical fertilizers and pesticides, DDT (dichloro-diphenyl-trichloroethane), lead and industrial effluents, oil spills.

3.5. Ali has some pea plants in his garden which need a support to grow as seen in the picture given below:



- Name the phenomenon depicted by the shoot in the given figure.
- Define the above phenomenon.

- c. Write the name of the part marked X.

**Solution**

- a. Thigmotropism. Tendrils coiling towards objects they come into contact with show thigmotropism.
- b. In plants, thigmotropism is a tropic movement in response to an external stimulus, sometimes referred to as a contact stimulus.
- c. The part marked X is Leaf Tendril.

**Question 4.**

- 4.1. Give the biological term for the surgical method of contraception in human females.

**Solution**

Tubectomy. This surgical operation closes the fallopian tubes, so the egg from the ovary cannot reach the uterus.

- 4.2. State two harmful effects of acid rain on the environment.

**Solution**

Acid rain causes damage to plants, fresh water supplies, soil, destruction of insects and aquatic life, corrosion of steel infrastructure like bridges, weathering of stone buildings and sculptures and detrimental effects on human health.

- 4.3. Enlist different advantages of transpiration.

**Solution**

- 1. It removes excess water.
- 2. It aids in the passive absorption of soil water and nutrients.
- 3. It promotes sap ascent.
- 4. Because stomata are open, gaseous exchange is enhanced, which is essential for photosynthesis and respiration.
- 5. It keeps the turgor of the cells intact.
- 6. Transpiration aids in lowering the temperature of the leaf and providing a cooling effect.

- 4.4. Write any two objectives of Swachh Bharat Abhiyan.



## Solution

Objectives of the Swachh Bharat Abhiyan:

1. Increasing the quality of life in rural areas by encouraging cleanliness and personal hygiene.
2. Bringing open defecation to an end across the country.
3. Building 90 million toilets in rural regions with an estimated budget of Rs. 1.96 lakh crore.
4. Promoting adjustments in people's attitudes towards sanitation and hygiene.
5. Encouraging communities to adopt proper sanitation methods for enhanced health.
6. Educating people about the relationship between sanitation, health, and well-being.
7. Encouraging and acknowledging technological advances in sanitation and hygiene.

4.5. Mohan is fond of playing basketball. His concentration is on shooting the ball into the opponent's basket as given in the picture.



- a. Which part of the brain helps Mohan to concentrate in putting the ball into the basket?
- b. Name the sense organ that helps to gauge the distance between the ball and the basket.
- c. Name the part of the brain that co-ordinates all the voluntary muscles of his body.

### Solution

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### Question 5.

5.1. Name the type of nerve which has the fibres of both sensory and motor neurons.

### Solution

Mixed nerves

### Explanation:

A mixed nerve includes both sensory (afferent) and motor (efferent) nerve fibres. All 31 spinal nerve pairs are mixed nerves, as are four of the twelve cranial nerves.

5.2. Differentiate between Australopithecus and Modern man based on body hair.

### Solution

	Australopithecus	Modern Man
1.	Australopithecus, our distant ancestors, had a significant amount of body hair covering their entire bodies.	Modern humans have significantly less body hair compared to Australopithecus.

2.	This dense fur provided them with protection against the elements and predators, much like how fur coats keep us warm in the winter.	This evolutionary change is attributed to the development of clothing and the migration of early humans to different climates as well as protection.
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5.3. Give suitable biological reasons for the following statement:

The birth rate in India is very high.

### Solution

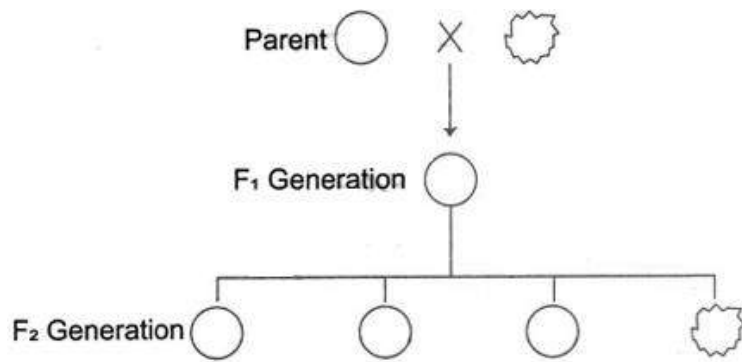
1. **Illiteracy:** Many people in rural regions are illiterate, uneducated, and superstitious, with limited knowledge of the human reproductive system.
2. **Religious and social customs:** Cultural beliefs and traditions can deter people from following family planning measures.
3. **Desire for a male child:** Many Indian households emphasise male offspring for carrying on the family name and supporting elderly parents, which leads to the birth of several children in search of a son.
4. **Inadequate access to family planning services:** The scarcity of contraceptives, combined with poverty and a lack of information, prevents people from choosing small family practices, adding to the persistently high birth rate.

5.4. Give the exact location of the pericardium.

### Solution

Outside our chest cavity, the pericardium surrounds the heart walls. It is a double-layered membrane that protects the heart from shock and injury.

5.5. Given below is a schematic representation of the inheritance of the shape of the seeds of garden peas. Answer the questions that follow:



- Which is the dominant and recessive allele of the trait?
- What does the ratio 3 : 1 in the F<sub>2</sub> generation represent?
- State Mendel's Law of Dominance.

### Solution

- The dominant allele is R (for round seeds), while the recessive allele is r (for wrinkled seeds). This is obvious because only round seeds develop in F<sub>1</sub>, whereas the wrinkled characteristic is entirely concealed.
- 3:1 indicates that three of the four seeds are spherical and one is wrinkled. That is, 75% of the F<sub>2</sub> progeny have round seeds (the dominant characteristic), but only 25% have wrinkled seeds (the recessive trait).
- Mendel's law of dominance states that if an organism has two distinct alleles for a trait, the dominant allele will be expressed, hiding the recessive allele. This means that only the dominant allele determines the organism's phenotype.

### Question 6.

6.1. Define the following terms:

Diapedesis

### Solution

Diapedesis is the movement of white blood cells from lymph capillary walls to neighbouring tissues, often for immunological defence.

6.2. Distinguish between Diabetes mellitus and Diabetes insipidus (endocrine gland concerned).

### Solution

Feature	Diabetes mellitus	Diabetes insipidus
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<b>Endocrine Gland Concerned</b>	Pancreas (Islets of Langerhans)	Pituitary Gland (Posterior part)
<b>Hormone Involved</b>	Insulin	Antidiuretic Hormone (ADH), also known as vasopressin
<b>Primary Dysfunction</b>	Inability to produce or use insulin effectively, leading to high blood glucose levels	Inability to regulate water balance, leading to excessive urination and thirst

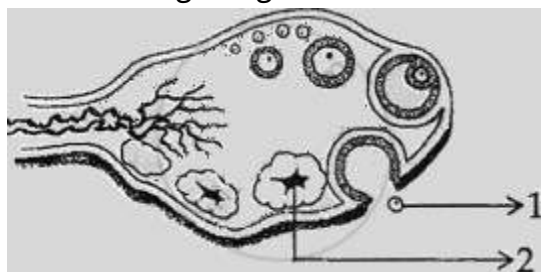
6.3. Give a scientific reason:

Carbon monoxide is highly dangerous when inhaled.

### Solution

Carbon monoxide, when inhaled and absorbed into the blood, binds with haemoglobin and forms an irreversible complex called carboxyhaemoglobin. The formation of this complex reduces the oxygen-carrying capacity of the blood. Hence, carbon monoxide is highly dangerous when inhaled.

6.4. The diagram given below shows a section of the human ovary.



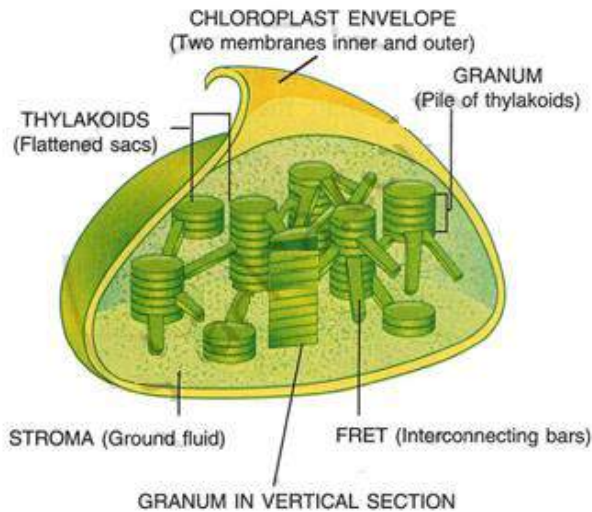
a. Name the process for the release of the part labelled 1.

b. Write the name of the structure marked 2.

### Solution

1. Ovulation. It is the release of a mature egg from the ovary into the fallopian tube.
2. Corpus luteum. The corpus luteum appears soon after ovulation, when an egg is released from the ovary. The corpus luteum's primary role is to secrete hormones (progesterone) that prepare the uterus to sustain growth.

6.5. Draw a neat, labelled diagram of a chloroplast.



## Question 7.

7.1. Define the following:

Hormone

### Solution

Hormones are chemical messengers created by the endocrine glands and transported through the bloodstream to govern body functions such as development, metabolism, reproduction and mood by interacting with specific target cells.

7.2.

7.2.a. Which part of the human ear gives 'Static balance' to the body?

### Solution

The utricle and saccule of the vestibular system (part of the inner ear) are in charge of static balance. They detect linear movements and the position of the head relative to gravity, showing whether you are upright, slanted, or lying down.

7.2.b. Which part of the human ear gives 'Dynamic balance' to the body?

### Solution

The semicircular canals in the inner ear are the primary source of dynamic balance. They detect rotational head motions and assist you in maintaining your balance while in motion, such as when walking, running, or turning quickly.



7.3. Describe the structural differences between an artery and a vein.

Artery	Vein
An artery is a vessel that carries blood away from the heart towards any organ.	A vein is a vessel which conveys the blood away from an organ towards the heart.
An artery has thick muscular walls.	A vein has thin muscular walls.
It has a narrow lumen.	It has a broad lumen.
There are no valves.	Thin pocket-shaped valves are present in the veins.
Arteries progressively decrease in size and branch to form arterioles. Arterioles further break up to form capillaries.	Capillaries unite to form branches called Venules. Venules further unite to form veins.

7.4. Write any two limitations of using a Ganong's potometer to demonstrate the uptake of water.

### Solution

The limitations of using Ganong's potometer to demonstrate the uptake of water are:

1. One of the biggest disadvantages is that correctly setting up and calibrating can take some time and effort, which can be inconvenient if you need to gather data rapidly.
2. Because the potometer relies on the plant's water intake to measure transpiration, variations in soil moisture or root pressure can skew your results.
3. Air bubbles in the tubing or leaks in the system can potentially interfere with your measurements.

7.5. A teacher drew the diagram of the heart on the blackboard and told the students to copy it in their notebooks. Mahesh couldn't see the diagram clearly as it appeared blurred to him.

- a. Name the defect of the eye Mahesh is suffering from.
- b. Where is the image formed in this defect?
- c. Mahesh consults an eye doctor and is prescribed suitable lenses to correct the defect. Which type of lens do his spectacles have?

### **Solution**

- a. Myopia or near-sightedness. Individuals suffering from this illness have difficulty seeing distant objects clearly, resulting in fuzzy vision for faraway objects while keeping crisp focus on close ones.
- b. The image is formed in front of the retina. This issue arises when the eye's power is excessive, which is typically a result of the crystalline lens's shorter focal length.
- c. A concave lens. A concave lens, which diverges incoming rays and focuses them on the retina, is widely used to rectify this issue.

### **Question 8.**

8.1. Define the following term:

Ultrafiltration

### **Solution**

Ultrafiltration is the process of filtering blood through the glomerulus. Because of the tiny efferent arteriole, urea-containing blood enters the glomerulus via the afferent arteriole at high pressure. The high pressure causes the liquid component of the blood to filter from the glomerulus into the renal tubule, resulting in the glomerular filtrate. The filtrate comprises water, urea, salts, glucose and other plasma solutes, whereas blood cells, proteins and big molecules remain in the glomerulus. As a result, the blood that the efferent arteriole transports is relatively concentrated.

8.2.

8.ii.a Name the mineral elements required for the clotting of blood.

### **Solution**

Calcium

### **Explanation:**

Calcium is an important mineral for blood coagulation. Blood platelet release of thromboplastin, which serves as a cofactor for vitamin K, which aids in activating blood coagulation factors and promoting blood clotting, causes it.

**8.ii.b** Name the mineral element required for the synthesis of thyroxine.

**Solution**

Iodine

**Explanation:**

Iodine is the primary component of the thyroxine protein. Thyroxine cannot establish its structure without the presence of iodine.

**8.3.** State any two harmful effects of noise pollution on human health.

**Solution**

Harmful effects of noise pollution on human health:

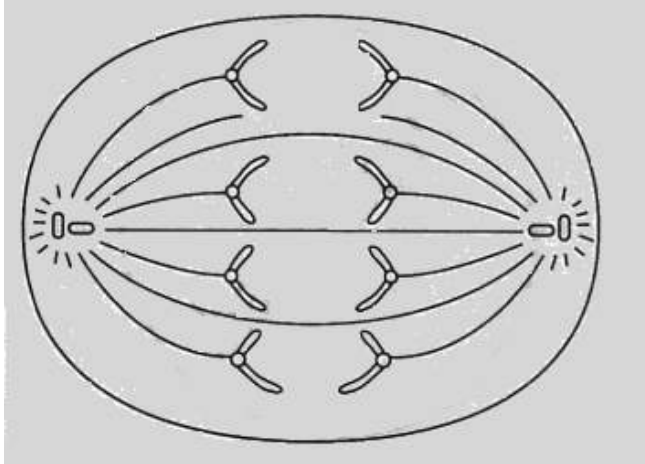
1. Prolonged exposure to high-decibel noise damages the eardrums and can cause permanent hearing impairment.
2. Noise pollution can lead to high blood pressure (hypertension), constant headaches and a lack of concentration.
3. It interrupts the thought process, resulting in low efficiency at work.
4. It disturbs sleep, which causes irritability and nervous disorders.
5. In urban areas, noise pollution from traffic, construction sites and industrial activities can disrupt wildlife habitats and interfere with their ability to communicate and find food.

**8.4.** Why are RBCs efficient in their functions though they lack nucleus and mitochondria?

**Solution**

A mature mammalian red blood cell lacks a nucleus or mitochondria. The absence of a nucleus increases the surface area to volume ratio of red blood cells, allowing for more oxygen absorption. Furthermore, the absence of a nucleus reduces cell size, facilitating smooth passage through blood veins and allowing for a higher cell count in a tight space. Without mitochondria, the cell cannot use the ingested oxygen for respiration, hence increasing oxygen transport efficiency by guaranteeing that all absorbed oxygen is transferred without loss. Erythrocytes produce and store high-energy phosphates through the anaerobic transformation of glucose.

8.5. The diagram given below represents a stage in mitosis.



- Identify the stage given above.
- Give one reason to support your answer in (a).
- Mention the number of chromosomes given in the diagram.

### Solution

- Anaphase
- Anaphase is characterised by the splitting of centromeres and the separation of chromatids, which move to opposite poles. This is readily obvious in the image provided. Hence, it is anaphase.
- The image contains eight chromosomes. The parent cell contained four chromosomes, which duplicated throughout the synthesis phase. During anaphase, they break and divide themselves evenly between the two daughter nuclei, resulting in each new cell having the same four chromosomes as the original.